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A study was devised to determine the validity and effectiveness of applying automation comcpets to rhythm instruction in music. Students from two semesters of a music class for the classroom teacher were divided randomly into experimental and control groups with 21 in the former and 29 in the latter. The experimental group read music from a training manual, listened to a two-channel tape consisting of background music and model rhythm music, played a rhythmic sequence to the background music on an organ, and received feedback indicating rhythmic errors from an electronic rhythm monitor. Control group students received traditional course instruction. Pre- and posttests consisted of music selections for which the rhythm was recorded by students; the posttest selections were longer and more melodic, and were played with fewer repetitions than the pretest selections. Mann-Whitney U-test results showed a high degree of effectiveness and validity, indicating that automated rhythm training techniques are a useful supplement to music instruction. A rhythm training manual which was developed for the project is included. (SP)

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FINAL REPORT
Project No. 8-A-008
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AN EXPERIMENTAL STUDY OF THE EFFECTIVENESS AND VALIDITY OF AN AUTOMATED RHYTHM TRAINING PROGRAM

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Storrs, Connecticut
06268

March 1969

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

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CONTENTS

	Page
PREFACE	1
SUMMARY	2
PART I. PROGRAMMED INSTRUCTION IN MUSIC UTILIZING AUTOMATED TECHNIQUES	3
Introduction	3
History of the Project	4
Related Research	5
The Problem	5
PART II. THE EXPERIMENTAL STUDY	6
Materials	6
Rhythm Re-defined	6
The Rhythm Monitor - Operational Principles	7
The Training Session	9
Recording Techniques	9
Dual-programming Principles	10
PART III. EXPERIMENTAL DESIGN	12
Description of Activities	12
Random Selection	12
Statistical Procedure	13
Data	15
Conclusions	16

CONTENTS (cont'd)

	Page
PART IV. SUMMARY AND APPLICATIONS	17
Use in Theory Programs	17
Other Applications in Music Training	17
The Timed Response - Applications in Other Fields	18
PART V. THE TRAINING MANUAL	19
REFERENCES	132
APPENDICES	134
A. Examples of Background and Training Material	134
B. Training Sequence Outline	136
C. Schematic - Rhythm Training Station	138
D. Picture of Training Station	139
E. Data Sheet - Scoring	140
F. Questionnaire - Student Reaction	141
G. Tests	142

PREFACE

This study is an outgrowth of an earlier interest in the principles of programmed instruction. The idea of automated training evolved shortly thereafter, and basic procedures were discussed and planned over a period of several years before the actual work was begun. At first, available time and space were minimal, but as the material grew in quantity, and as ultimately a training machine became available, the pace and dimensions of the project increased rapidly.

Many people were involved during the eight years' span of the project. Two men gave invaluable encouragement and advice at the outset. Dr. Robert B. Miller, IBM Co., and Dr. B. F. Skinner, Harvard University, started the project in the proper directions. Special thanks go to my brother, Elmer A. Ihrke, who quickly grasped the implications of the training idea, and designed and built the two existing electronic devices. In addition he offered valuable advice in musical and pedagogical matters.

Thanks are due the many students who participated in three various experiments, and whose pleasure in taking the training was heartening. Student assistants, including Michael Zinn, David Barnebl, Louis Cohen, and graduate assistant Peter Chenausky were especially helpful.

Finally, various administrative members of the University of Connecticut faculty should receive a word of appreciation. These include Mr. Louis Crowder, Head of the Music Department, Dr. Frank Cookson, Dean of the School of Fine Arts, and Dr. Hugh Clark, Associate Dean of the Graduate School for Research.

SUMMARY

The purpose of this experimental study was to test the validity and effectiveness of automated rhythm training techniques. The device used consisted of four components, - the training manual, electric keyboard, tape recorder, and an electronic rhythm monitor. The monitor compared signals from the tape model and from the student keyboard response, providing immediate feedback in terms of "early" and "late" error lights. A linear program of 235 items was used. The response by the student was made concurrently with the hearing of background music which provided a musical setting for the rhythmic response.

Experimental subjects were randomly selected from a class of elementary classroom teacher trainees, the purpose being to see whether basic rhythmic proficiencies can be provided by this means, and tested against results obtained by traditional methods in the classroom. A pre-test and post-test provided data for statistical treatment.

Results indicated a high degree of effectiveness, the null hypothesis being rejected at the 0.001 level.

PART I. PROGRAMMED MUSIC INSTRUCTION UTILIZING AUTOMATED TECHNIQUES

Introduction

The concept of automation appears to be directly antithetical to that of musical expression in performance. The performer customarily allows himself liberties predicated on his knowledge, experience, technical facility, and external performance conditions, all of which constantly tend to modify his performance. Excessive liberties are decried as evidence of poor taste, meager talent, or poor training. Freedom in the application of rhythm and tempo elements is difficult, well-nigh impossible, to teach directly without the frame of reference of accuracy and precision. Automated training techniques provide this frame of reference.

Rhythms are expressed in a time sequence and therefore lend themselves readily to precisioned treatment. A new training technology combining electronic circuitry capable of responding in terms of microseconds, and rhythmic material arranged in a programmed instructional sequence, provide the means of applying these techniques. It is not necessary to apply temporal measurements so small that the human mechanism is incapable of duplicating it; but, on the contrary, too little constriction is equally unwise since it would damage musical thought and meaning as indicated by the composer's music score. It seems logical to use precision as a basis, subject to variable error tolerance made adjustable by the electronic training device. The adjustment in error tolerance is geared to the proficiency level of the student, and provides a thoroughly objective reading of student response. This is in contrast to human teacher decisions which tend to be highly subjective. The warmth of the human relationship is not entirely absent since the spoken material on the tape and the written material in the training manual offer communication from teacher to student.

The complexity of the music learning process defies thorough definition. It does include at least the four specific techniques of reading, hearing, performing, and writing. It is advisable to proceed in the stated sequence, - that is, to read the notation, translate it immediately into tonal sound, and then on the basis of this tonal concept, either to perform or write. In this way the tonal concept serves as a stimulus for the performance which otherwise is a mechanical procedure.

In designing the techniques to be used in this project it was decided to present material to be read from a training manual, to give an aural background by means of tape, and to provide a keyboard for student performance. This type of programmed instruction is somewhat more complicated than most, requiring careful sequencing of the material to be played as well as that to be heard in order to produce acceptable student response. Programmed instruction is now widely accepted as a valid means of presenting materials in many fields, and it offers rich possibilities in music training.

History of the Project.

After two years of preliminary discussion and planning, decisions were made as to basic training format, machine design, and machine function. Then in 1961 the entire project was planned and outlined, and material was prepared for preliminary testing. In 1962 a machine was successfully demonstrated using taped program materials. In 1963 a pilot program was conducted at the University of Connecticut in which machine functions were simulated by human monitors. In this way the program material was tested for its effect on the student, and the reaction to automation, flashing signal lights, and related conditions were noted. These human monitoring techniques were used because the machine was not yet ready for the rigors of a continuous training schedule. It was found that students made very few errors and that errors were frequently corrected in a single repetition of the training item. On this basis it was decided to include two statements of the training material in each item; in other words, each item contained a "built-in" repetition. It was also found that pseudo-mechanical approach to training problems was not disturbing, and background music, sounding while the student responded rhythmically, generated a lively and enthusiastic response.

Subsequently two grants from the University of Connecticut Research Foundation provided time and space for an experimental study. The results of this study were included in a proposal submitted to the U. S. Bureau of Research with the result that a USOE grant was awarded for the period from September, 1967 to June, 1969.

Related Research.

Since this project does not deal with basic research except by implication, but is an experimental study under the heading of applied research, the following will refer only to related research which involves a program of study and some form of programmed instruction.

Early attempts provided for a written response by the student in terms of comparison with a printed "model". Barnes[1] and Clough[2] produced virtually identical material relating to the elements of music theory conceived as factual material to be read from the book and responded to by written replies of various kinds. The fault here lay in the complete absence of the sound of music while the training was presumably taking place. This could be termed informational learning. Great forward strides were made when taped or otherwise recorded sounds were incorporated in this type of programmed instruction. Carlsen,[3] Spohn,[4] and Andrews and Wardian[5] provide good examples. Dallin[6] and Kraft[7] continued these techniques.

The Problem.

The project began to take shape as a three-part design. First, a device had to be designed and constructed to read student rhythmic response and provide immediate feedback. Second, a training manual had to be written containing items in rhythm, and a two-channel tape needed to be recorded which would contain the rhythms of the training items and the coordinated background music. Third, an experimental study had to be designed to test material and method. By these means we were to test the hypothesis that automated rhythm training was a valid and effective learning technique.

PART II. THE EXPERIMENTAL STUDY.

Materials.

The materials used are selected from folk song sources and standard orchestral, choral, instrumental, and vocal literature. The purpose in doing this is to establish a high degree of musical quality, which is not accomplished if the material is constructed directly on the basis of the specific rhythmic training problem.

The rhythms in the training items are derived from those already present in the background music, or taken directly from the musical scores of more elaborate examples.

Rhythm Re-defined.

It is customary to think of tones in terms of pitch and duration. But the duration of a sound in a performance situation varies according to the type of instrument being played, and is affected by interpretive factors as well as by the acoustics of the room. Consequently it is difficult to define accurately the conclusion of a tone, and it is therefore advisable to relegate the problem of tone duration to the area of interpretation because of the many modifications required in performance. The critical point, then, in consideration of rhythm is the initiation of the sound. This can be specifically determined, and readily measured electronically. Further study points to the necessity of re-defining the term, and it is suggested that rhythm now be considered as the spacing of tonal attacks (or initiations) in a timed response sequence. For instance, the dotted-half and quarter is generally described as consisting of a tone that begins on the first beat and continues to the fourth beat followed by a tone that begins on the fourth beat and ends at the beginning of the next first beat. It is more accurate to say that this rhythmic bit consists of two attacks, one on the first beat and one on the fourth beat. Predicated on this definition we can consider all musical statements to be a combination of sound and silence, each of these having definite initial points. Continued application of this rhythm concept clarifies problems as they appear in a training situation, and does this without damage to the derivation of meaning in music which is contained in the factor of duration. It must be remarked that the above statements do not intend to minimize the importance of tonal duration, but merely focus the attention on attacks in a training program of this type, reserving the richness of duration manipulation to periods when interpretation is involved. Thus interpretation considerations could follow precision considerations, thereby liberalizing the total training result without losing the control gained through this rhythm training.

The Rhythm Monitor - Operational Principles.

The training equipment consists of four basic components:

1. The printed manual read by the student.
2. An electric organ.
3. An electronic rhythm monitor.
4. A stereo tape recorder capable of providing automatic tape stop.

The electric organ originally used was a Hammond, selected because of its high degree of pitch stability. Later this was replaced by the Hammond Solovox which provides a three-octave keyboard with built-in speaker and amplifier. A single knob provides instant pitch regulation. The tape recorder is a Viking 220 Retromatic with a photo-electric cell circuit which is modified to provide automatic re-cue as well as the standard automatic stop.

The electronic rhythm monitor was designed and built by Elmer A. Ihrke in accordance with a basic training idea and training functions originally submitted by the principal investigator. At every step along the way the machine was modified when necessary so that no compromise had to be made in the training functions.

The rhythm monitor accepts signals from the tape and from the keyboard, compares these, and indicates whether each response is acceptable or not. Each impulse received by the monitor from the tape recorder will trigger one of two "error" lights unless the student responds with a similar properly-timed impulse by tapping a key on the keyboard. The machine permits a short time interval during which the student response will be accepted as correct. The allowable degree of error or "cushion" time is adjustable from 0.1 second to 0.25 second. The long cushion will permit the student to perform acceptably in the slower exercises at the start of the training, and as his skill increases the cushion time can be reduced to demand more exact response at faster tempos.

The exercises to be performed by the student are read from a printed page. They consist of notes of various duration values in a variety of musical patterns. After reading basic instructions in operating the machine, the student presses the "start" button. He now hears additional spoken comment and an introduction in the form of a count-down on either earphones or a speaker. Included is the sound of a metronome which in early exercises continues on each beat throughout the exercise, later is heard only on each first beat in a measure, and finally is used only in the count-down to set the tempo of the exercise. This audible information is recorded on channel A of a two-track tape. The second track, channel B, is inaudible to the student, and contains the impulses of a properly-played exercise which the student is to duplicate by his performance. The impulses recorded on channel B trigger the various circuits of the machine.

If the student does not respond within the allowable time limits, one of the error lights will immediately be triggered, and will continue "ON" until the next correct response. At the end of the exercise item the machine will stop automatically. The student now has a choice; he may repeat the exercise or he may continue to the next. If he chooses to repeat, he presses a "repeat" button which causes the machine to rewind to the start of the exercise just completed and automatically stop again. The student can then repeat the procedure by pressing the start button as before. On the other hand, if he chooses to continue without repeating, he can proceed directly to the next item.

There are additional response modes available in either of the two basic modes, repeat or forward. These are:

1. Play what is on the page while hearing only the background. This is considered the normal procedure.

2. Listen to the background and read the page without playing. In this case he hears only the background music.

3. Listen to both channels, background and model, while playing.

4. The same as (3) without playing.

5. Listen to the model and NOT the background while either playing or not playing.

The Training Session.

The total concept of automated rhythm training combines three basic elements, - the student, the monitor, and the machine. The role of each of these elements is essential to the proper functioning of the method. Each operates in a specific manner producing a student-oriented, student-paced training program.

The student begins by reading the material explaining the item before him. From this point on he is free to proceed at his own rate with as many item repetitions as he wishes, or with a continuous progress from item to item. Number of errors is recorded by the assistant, and this record is the basis for program revision, and not the basis for student scoring. Reliance is placed on student reaction to signal lights and his wish to keep errors at a minimum. In this sense the method of scoring each day's work is absent, and scoring if it needs to be done in the progress of the course can be done by tests given at prescribed intervals. Thus the student is relieved of the tension produced by excessive attention on each error if a teacher is present. The number of errors is then a private matter, and the student reacts to it unrestrainedly. He does not necessarily have to repeat an item if it is not played flawlessly. He can proceed if he wishes since material of the next item may be just as helpful in correcting the original problem. In addition, review sections reinforce the learning by providing problem repetition. These options in sequencing are possible in a linear program, whereas such continuity may not be possible if each item contained material isolated in degree of difficulty.

At the conclusion of the session the student is aware of having had contact with a device which is sensitive in its response and, in its interaction with his response, free of personality conflicts. The assistant merely observes equipment function, especially in emergencies, and saves student time by having materials ready. The training device requires supervision since it is still in a prototype stage, and adjustments have to be made, particularly in balance of volume between the two channels.

Recording Techniques.

Since the program uses two channels simultaneously, the recording has to be synchronized in order to produce the desired results. To provide a reliable and accurate device for recording rhythmic signals, a special electronic metronome was constructed which can, by depressing one key, automatically record the metronome pulse and in more complicated rhythmic patterns provide a key on which the actual rhythm can be played as it is on the keyboard instrument. The metronome runs constantly at an adjustable rate as a guide to the background recording, and as an introductory count-down for the student, and this is accomplished by an operator who depresses a foot pedal which sends the signal beats through the head set to the student. (See Schematic for detailed signal patterns. Appendix C)

Three people are needed for recording sessions, although in the early stages of the project a single person operated all recording devices. One person runs the tape recorder and adjusts volume controls, the second operates the electronic metronome, and the third records whatever material is to be heard on the channel audible to the student, namely introductory remarks and instructions, and the background music which is either performed on the Hammond organ or recorded directly from a commercial recording on a turntable. As the work progressed, new recording techniques, new patterns of response, and new signal patterns between operators were developed so that eventually the entire recording operation became a smoothly running procedure.

Dual-programming Principles.

The heart of the programmed instruction concept is the sequencing of the material to be learned. As the student moves from item to item he must face problems which are neither too easy nor difficult. He will lose interest if not challenged, and be discouraged if the task seems impossible. Thus the programmer must steer a difficult course between these two extremes. This difficulty is compounded in this program since the student must be aware of two distinct channels of information. These must be programmatically synchronized in order to effect the proper training, and it is this synchronization which is the special task of the programmer.

At first the design is fairly simple with the student responding to printed material and heard beats, playing rhythms on a single pitch. This is done in an accompanying setting of background music in order to produce a musical climate for what would otherwise be a coldly impersonal rhythm problem. But after careful scrutiny of just exactly what information and assistance this background provides, it was found that it also could be a source of PREPARATION for rhythmic tasks required later in the sequence of training. As a simple example, the background can contain various divisions of the beat while the student's items consist of rhythms of one beat or multiples of the beat. Although he merely hears these patterns while playing other simpler patterns, he is involved in a situation where the heard patterns are an integral part of his total experience at the time. Therefore this can be called experiential program. This project makes no attempt to specify the amount or degree of learning taking place as a result of experiential programming, but later studies will attempt to prove this hypothesis. (See Appendix B. The training sequence) It should be noted that the first 33 items contain directional aids such as the voice counting beats, arrows indicating on the score where to begin playing, and dots introducing rests.

Since this program is designed for beginners, the problem of playing the required pitches is simplified as much as possible by naming the note, and indicating by means of a printed card directly back of the keyboard the location of that key. Gradually notes are added which lead to the introduction of harmonic concepts. The tones selected are the roots of chords implied by the melodic background. This is done in very simple rhythms at first, and paired with an item containing previous rhythmic patterns. Furthermore, since the review section (Items 174-205) contains old material, the new programming idea is simply added. Thus a review is not merely a review, but offers the opportunity to present new ideas. Beginning with Item 206 , still another format is introduced. It should also be noted that Items 1-173 contain a built-in repetition so that the student has two exposures to the problem in a single item. (See Part V. The Training Manual) This guarantees at least one repetition even though the student chooses the option to proceed instead of repeating an item. The automatic stop function is arranged to operate only at the end of an entire item.

PART III. EXPERIMENTAL DESIGN.

Description of Activities.

Students were selected at random from a class enrolled in a University course called "Music for the Classroom Teacher." Since class size could not be determined in advance, the study was designed to include two semesters so that students could be selected from two semester enrollments. This made it possible to have twenty-one in the experimental group and twenty-nine in the control group.

All students registered in the course were given a pre-test and post-test whose items contained identical basic material. (See Appendix G) The post-test was considerably more difficult than the pre-test. The x-group spent two hours, singly, in the training laboratory receiving programmed rhythm training while the c-group received its training along traditional lines in the regular class time. In order to achieve a comparable balance of training time, the x-group was excused from class attendance during the two half-hour periods per week that the c-group received training.

The pre-test consisted of twenty-four examples dictated in the traditional way at the piano with each example played three times using a single pitch. The rhythm was recorded by the student, using pencil and paper. The post-test had a similar design, but each example was played only twice, was melodic, and double the length of pre-test examples. Since the post-test was more difficult than the pre-test, and the examples were played with fewer repetitions, it was expected that the number of errors would be significantly greater at the close of the training period, and would serve as material for comparison.

Although music activity and especially performance does not ordinarily take the form of isolated rhythm activity but is associated with pitch, melody, chords, and other music elements, nevertheless rhythm was separated from other elements as much as possible without damaging the inherently musical training climate. This was done by providing background music which sounded concurrently with the played items, while feedback from the machine to the student consisted solely of rhythmic error indications.

Random Selection.

Selection of students for the x-group was not based on any type of formal music test since the members of this group had very little or no formal music training. This suggested that the best procedure would be to begin with fundamentals and progress very gradually to more sophisticated material. (See Appendix B. Training Sequence)

Since at first only one training station was available, and later only two, selection was made on the basis of a number of factors such as availability of the training area, student monitor schedule, and student trainee schedule. The combination of these factors resulted in random selection.

Statistical Procedure.

The original plan was based on the following procedural items. It was assumed that errors about true performance would be in normal distribution. The variable was to be identified by the difference scores. The null hypothesis would be tested at the 5% level. At the conclusion of the training the data (page 15) was examined and an attempt was made to use the customary F-test. But when the frequency of scores in each of both groups was graphed, the resulting curves were not Gaussian, indicating that the basic assumptions underlying the F-test were violated.

Since the population was obviously not single but double, the Mann-Whitney U-test was considered appropriate. The detailed procedure follows:

a. Difference between pre-test and post-test scores was computed.

b. These were arranged in order (rank) from the smallest to greatest.

c. Total number of subjects in each group $N_x = 21$ and $N_c = 29$

d. Total in terms of rank in each group $T_x - 377$ and $T_c = 889$

e. Formula: $U = N_x N_c + N_x \frac{(N_x + 1)}{2} - T_x = 463$

f. But U is greater than $\frac{N_x N_c}{2} - U$ which equals 304.5

g. Therefore $U' = N_x N_c - U$ is used (instead of 463) which = 146

h. Mean = $\frac{N_x N_c}{2} = 304.5$

i. Standard Deviation = 51

j. $z = \frac{U' - 304.5}{51} = -3.11$

k. The formula takes into consideration the fact that one group is larger than the other.

The fact that $T_x = T_c$ indicates the significance of the experimental hypothesis.

DATA

Rank	Group	Pre-test Score	Post-test Score	Difference
1	X	20	10	-10
2	X	28	21	- 7
3	X	59	54	- 5
4	X	56	59	3
5	X	1	5	4
6	C	4	9	5
7	C	18	30	12
8	X	5	18	13
9	X	29	43	14
10	X	13	28	15
11	X	6	22	16
12	X	27	44	17
13	X	42	60	18
14	X	36	56	20
15	C	28	50	22
16	C	19	47	28
17	C	29	59	30
18	C	14	46	32
19	X	20	53	33
20	C	11	46	35
21	C	23	62	39
22	C	24	63	39
23	C	2	41	39
24	C	14	54	40
25	X	29	72	43
26	X	38	82	44
27	C	8	54	46
28	C	35	82	47
29	C	30	80	50
30	C	57	110	53
31	C	23	77	54
32	C	37	91	54
33	X	6	67	61
34	C	48	113	65
35	C	42	107	65

DATA (cont'd)

36	X	81	146	65
37	X	57	122	65
38	X	52	119	67
39	C	49	122	73
40	X	35	114	79
41	X	64	144	80
42	C	55	143	88
43	C	32	121	89
44	C	35	124	89
45	C	96	187	91
46	C	34	127	93
47	C	15	114	99
48	C	36	146	110
49	C	54	165	111
50	C	58	173	115

Conclusions.

The frequency of scores appears to be in a two-population distribution. Using the Mann-Whitney U test for testing of hypothesis in a two-population distribution, a z of 3.11 is calculated. Thus, according to standard statistical tables, the null hypothesis may be rejected at the .001 level.

At first it was difficult to explain the "two-humped" curve which resulted by graphing for the F-test. A possible explanation was the nearly identical distribution of talented versus untalented in each of the two groups. This indicated that the device and the training program could possibly be useful as a test of musicianship in untrained as well as trained students. This is an assumptive statement at this point, and has not been tested for validity.

PART IV. SUMMARY AND APPLICATIONS

Use in Theory Programs.

The results of this study indicate the effectiveness and validity of automated rhythm training techniques. Although the students trained were not music majors, it is safe to assume that this training would be equally effective for majors. The material has been informally tested for this group and results are very encouraging. Thus it is possible to incorporate automated training into theory courses, especially elementary courses which are often remedial in nature. Just what portion of the course should be relegated to this area is of course a decision for the teacher of the course. Relatively little space would be needed for a bank of training stations, since the equipment is designed for modular teaching arrangements.

It should be noted that teachers can program their own material and are not committed to marketed material or the contents of the original training package. Plans are being made to provide relatively inexpensive recording equipment to put this "do-it-yourself" plan into operation.

The present program can be used as remedial training for band, chorus, and orchestra members. In this case the director can refer to a specific tape dealing with the particular problem at hand. This can save a great deal of rehearsal time otherwise spent in correcting poor individual performance for one person while the rest of the organization is idle. It is also possible to record the current rehearsal repertory as background music on the training tape, thereby providing the actual material against which the rhythms of the player's score can be programmed.

Other Applications in Music.

The training manual included in this report deals solely with tonal attack. Similar programs can be designed for tonal release, or "rest" initiation. The rhythm monitor is easily adaptable to this alternate training, and the change from attack to release study requires merely the operation of a simple switch. Thus it is possible to combine the two into a master program.

The present device is capable of treating any program requiring the student to respond by playing on a keyboard with accompanying music in the background. Another possibility is a contrapuntal study which programs the entire fugue in the background while the student plays the fugue subject on the keyboard. The objective in this is to develop a closer identification with fugue structure. The same could of course be done with other forms of music, in which case thematic material of all sorts could be identified through performance.

The question naturally arises concerning training in other elements such as pitch. This requires an entirely new device for reading pitch performance. However, the training concept of the rhythm monitor could be retained, namely the response in a time sequence, and the feedback by means of lights which in this case would read "high" or "low" in pitch as compared to the programmed model. This device is in the planning stage, but could eventually provide thorough pitch training as interestingly and as functionally as the rhythm monitor does. Whether or not the pitch monitor and rhythm monitor can be combined to provide melodic training is at this point debatable, since the amount of feedback as indicated by four different lights may be excessive in terms of the readability problem for the student. At any rate,the direction which training expansion should take is clear.

The Timed Response - Applications in Other Fields.

The timed response has an application in industrial practices. Frequently workers are required to manipulate materials or machine controls in a rhythmic pattern. These patterns could be programmed for training on the rhythm monitor. Sometimes speed and agility of hand or foot movement is necessary in order to avoid injury to the man or damage to the machine. A program to develop this speed and agility could be programmed on the rhythm monitor since this device is adjustable in reading response in reference to a referential signal on the tape.

There is also the possibility of application in the field of physical therapy. For example, in cases where eye and muscle coordination has been impaired, and in other cases of coordinal malfunction, this can be remedied by a program which would require response to a signal in varying time spans until the desired response speed is acquired. If this is accompanied by a musical background to enhance the training atmosphere and provide additional motivation, considerable therapy could be effected.

AUTOMATED MUSIC TRAINING

RHYTHM TRAINING MANUAL

Walter R. Ihrke

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RHYTHM TRAINING MANUAL

General Directions

1. Information will come to you from this manual and from the tape machine.

2. The material in the manual is arranged in items. The voice on the tape will announce the NUMBER of the Item at the beginning and end of each item.

3. The machine is operated by the control panel at your side. The START button on the right will roll the tape forward, and the REWIND button on the left will reverse the tape direction.

4. Do not press either START or REWIND unless the READY light is lit. This light is bottom center on the control panel.

5. Your response should be in the following order:

   a. Read the instructions.

   b. If READY light is lit, press the START button.

   c. Listen to the tape, and follow the instructions given by the voice on the tape.

6. The tape will stop automatically at the end of each item. If you decide to repeat that item, press the REWIND button. The tape will then reverse, automatically recue to to the beginning of that item, stop, and wait for you. When you are ready to proceed, check the READY light, and press START. You may wish to re-read the instructions for that item before repeating.

7. Later you will be given precise directions for tapping a key on the kayboard.

8. The machine is a rhythm monitor, and will inform you whether your response was acceptable or not. This is done by means of two lights located on either side of the manual. If you respond correctly, neither signal will light. If you tap too early, the EARLY signal (on the left) will light. If you tap too late, the LATE signal (on the right) will light. If an error lights up one

or both signals, they will stay lit until they are cancelled by a correct response as the item of training continues.

9. If you have trouble with the machine, press the EMERGENCY STOP button on the control panel. If something occurs that you do not understand, turn off the machine and see the training assistant.

MEET THE MACHINE

1. Your responses to the spoken and written directions will be made on the organ keyboard.
2. In order to get the feel of the keys, play a few tones at random.
3. Notice that the sounds are crisp and clear, and that you have to be very definite in playing the key. You can use a full arm motion, a wrist motion, or a finger motion. Any one will do as long as it is a definite stroke.
4. In playing a key you are merely closing an electrical contact, so that your "touch" does not affect the volume or quality of tone.
5. As another test, see if you can play a melody.
6. When you feel that you are ready to begin the training sequence, turn the page to Item One.

REMEMBER TO PROCEED IN THIS ORDER:

READ - - - - - - - - - START TAPE - - - - - - - - - RESPOND

Item 1. The first few items will acquaint you with the kinds of information you will receive from the tape. These are metronome sounds, called either TICKS or BEATS. The rate of speed of the BEATS is called TEMPO.
You will hear 16 ticks at a moderate tempo, a pause, and 16 more ticks.

Push START button, and let your eyes follow the dots as you hear the ticks:

. . . .

pause and repeat

. . . .

The machine has stopped. If you wish to repeat this item, push the REPEAT button, and wait for the READY LIGHT. Then push START. If you don't repeat, proceed directly to Item 2.

Item 2. It is easier to read and follow the sound of the beats if they are printed in groups. Here we have a grouping of four, separated from other groups by BAR LINES:

| . . . . |

One group like this is called a MEASURE.

The tempo (speed) of music varies from slow to moderate to fast. Here are two examples, one in a slow tempo, and one in a fast tempo.

slow tempo 12 beats pause 12 beats

Push START, LISTEN, and follow the notation.

| . . . . | . . . . | . . . . | pause | . . . . | . . . . | . . . . |

fast tempo 16 beats pause 16 beats

| . . . . | . . . . | . . . . | . . . . | pause

| . . . . | . . . . | . . . . | . . . . |

Machine stops

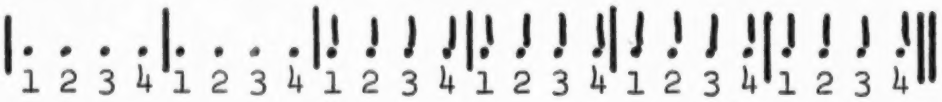
Item 3. DO NOT PRESS START BEFORE READING ALL DIRECTIONS

Now you will be trained to follow the printed symbols as you listen to the metronome, and to respond by playing a key on the keyboard. This must be done IN TIME with the beats you hear. Thus you will be reading, listening, and playing at the same time. This is called KEEPING TIME, and is the most basic of all music skills.

Dots indicate introductory beats, and are not to be played. Dots with stems are called "quarter notes", and are to be played.

This is an example of what you will see in each item. Read this without playing or starting the tape.

Metronome

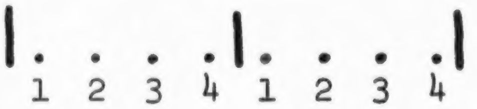


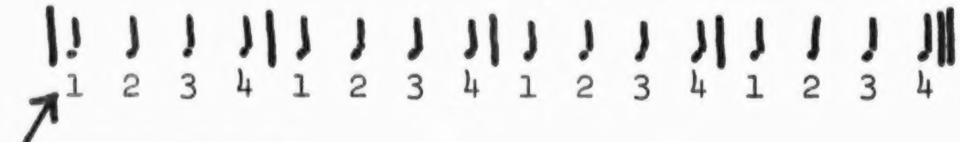
You begin to play here ----↑

After studying this diagram carefully, you are ready to begin, using whichever hand seems natural.

START

moderate tempo 4/4

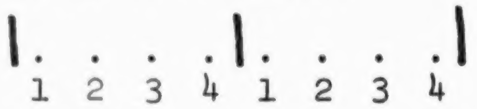


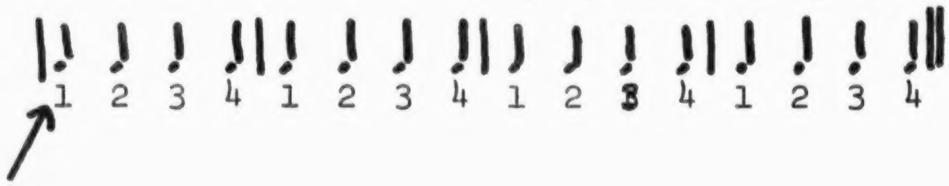


pause, repeat

Now the entire item will be repeated, and error signals will light if you tap too early or too late.

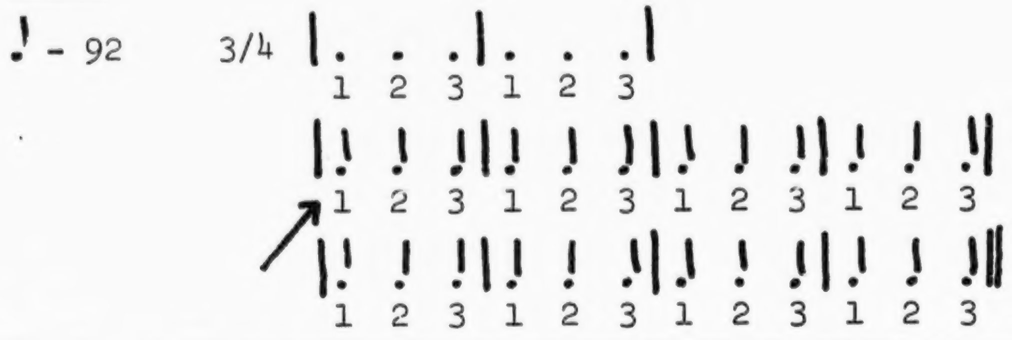
moderate tempo 4/4



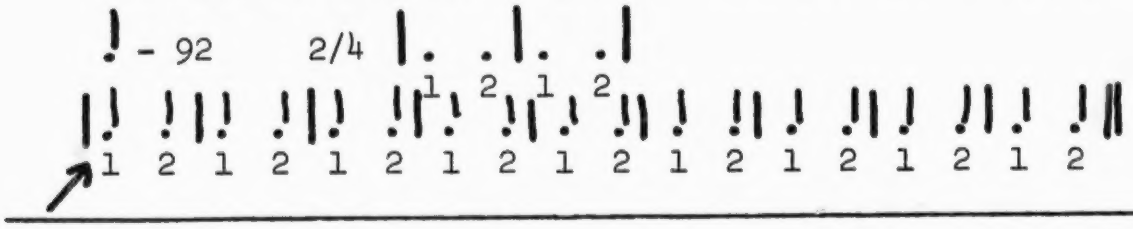


Item 4. We have had four beats in a measure. Other groupings are possible. Here is a grouping in threes. Notice the tempo is indicated by the symbols ♩ - 92 which represent a tempo of 92 quarter-notes per minute. Also notice the arrow which tells you exactly when to begin playing.

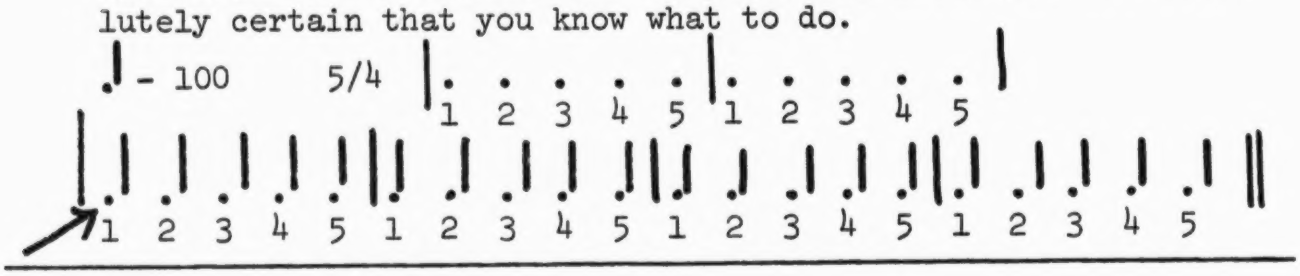
START


- 92
3/4
1 2 3 1 2 3
1 2 3 1 2 3 1 2 3 1 2 3
1 2 3 1 2 3 1 2 3 1 2 3

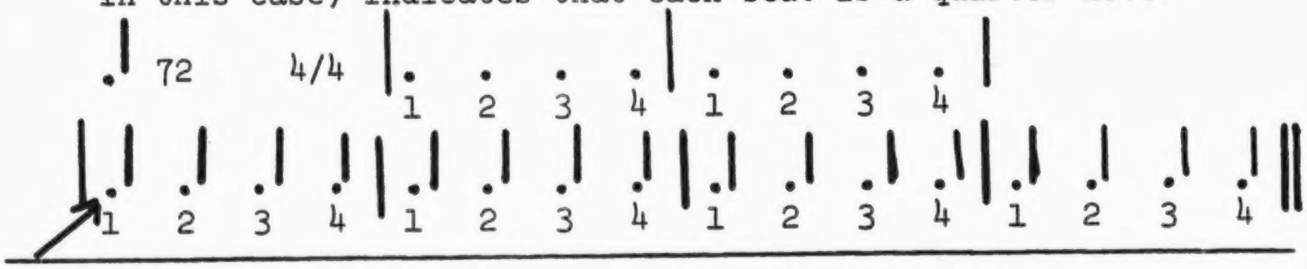
Item 5. Now a grouping of twos. From now on, the directions to start the machine will not be given. When you are ready, press START.


- 92
2/4
1 2 1 2
1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2

Item 6. Each of the following measures has five beats in a measure. This grouping does not occur as frequently as 2/4, 3/4, or 4/4. You will not be told when to start the tape. Start after you have read the directions on the page, and after you are absolutely certain that you know what to do.


- 100
5/4
1 2 3 4 5 1 2 3 4 5
1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5

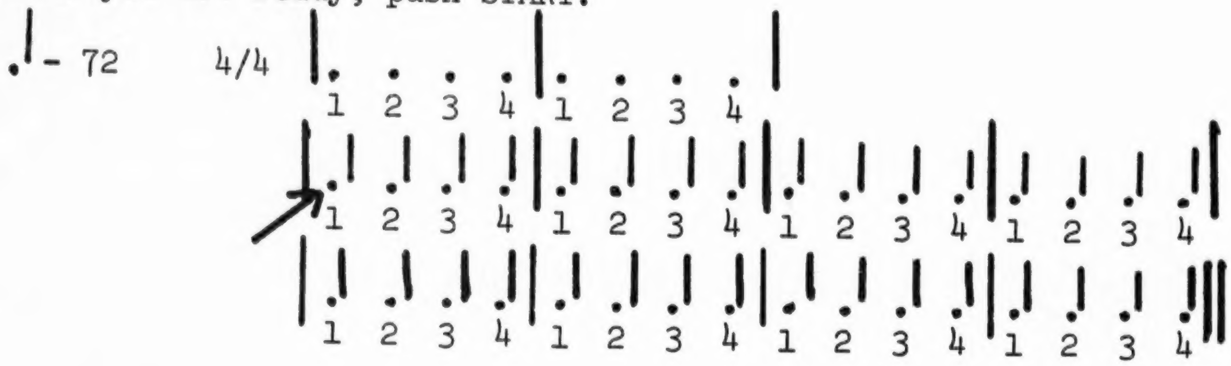
Item 7. You probably are curious about the fraction (4/4) which is printed just ahead of the introduction. This is a TIME or METER SIGNATURE. The upper figure of the fraction (4) indicates that each measure has four beats, and the lower figure (also 4 in this case) indicates that each beat is a quarter note.


72
4/4
1 2 3 4 1 2 3 4
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4

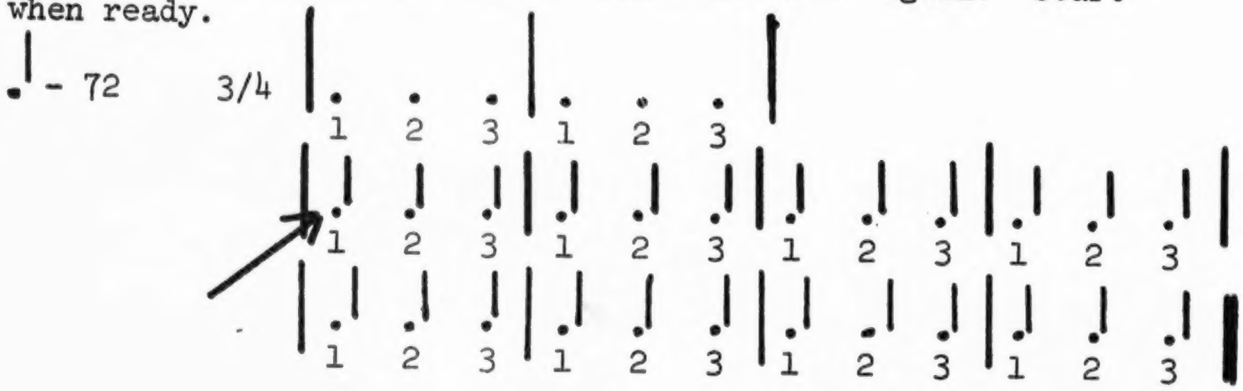
Item 8. We are now ready to try something new. This item is similar to Item 7 so you should respond as before. But as you play the key you will hear a melody coming from the tape, one tone for each tap. In order to make this sound as musical as possible, you must play a "C" on the keyboard. The cardboard guide back of the keyboard will help you locate a "C".

Notice that there are several "C's" on the keyboard. Find one that is comfortable for one hand, and another for the other hand. Remember to change hands when the item is repeated.

When you are ready, push START.

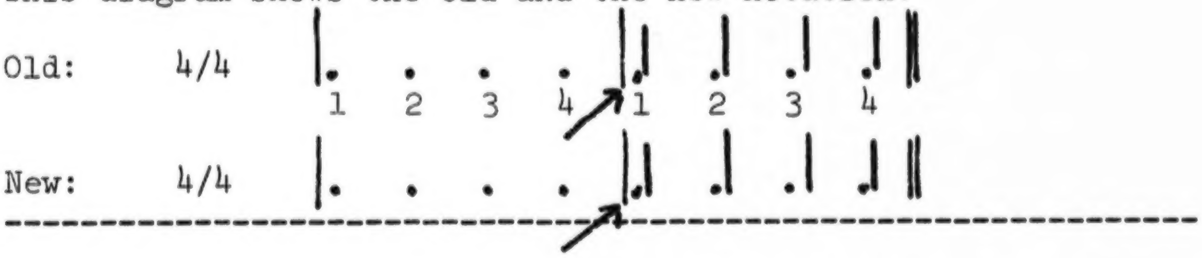

- 72
4/4
1 2 3 4 1 2 3 4
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4

Item 9. This item is in 3/4 time. Find two "C's" again. Start when ready.


- 72
3/4
1 2 3 1 2 3
1 2 3 1 2 3 1 2 3 1 2 3
1 2 3 1 2 3 1 2 3 1 2 3

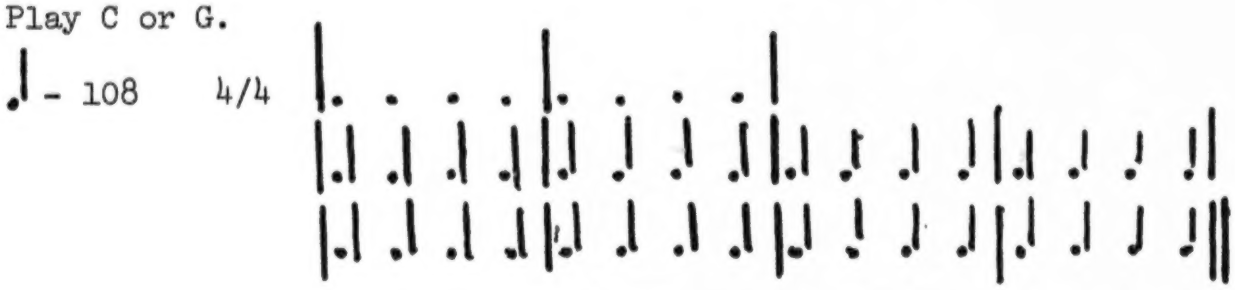
Item 10. Until now you have been guided by numbers under each beat, and by an arrow telling you when to begin playing. Now the numbers will be omitted but the arrow will still help you.

This diagram shows the old and the new notation:



Now you are ready to try the new notation. As you begin, follow the dots with your eye as you listen to the ticks. Begin to tap at the first quarter-note after the dots.

Play C or G.

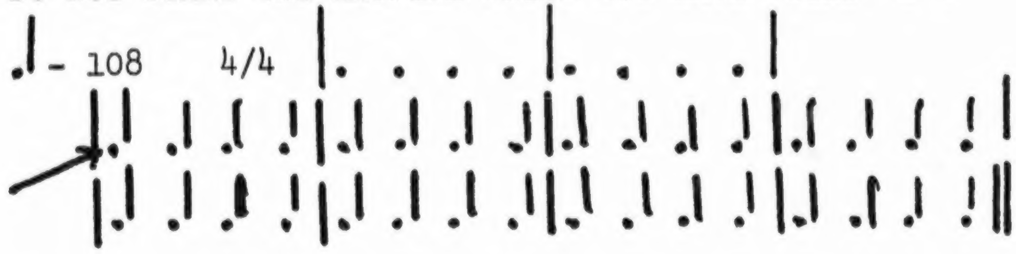


Item 11. Beginning with this item, most of your information will appear in this manual instead of on the tape. Occasionally the tape will help to explain new training features, but generally will vocally announce only the item number, the tape to be reversed, and the end of the item. The machine will stop at the end of each item unless there are other instructions.

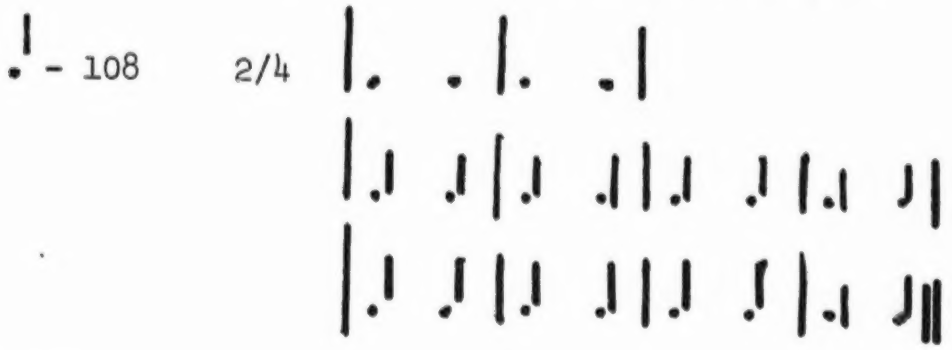
Find two keys marked "G".

Begin to play at the first quarter-note (indicated by an arrow) and continue playing to the end. After a pause, the item is repeated, as usual.

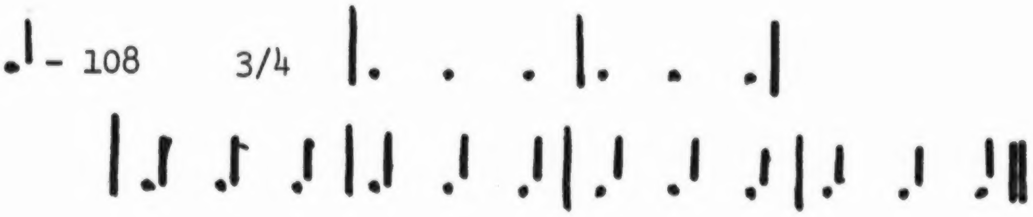
DO NOT START THE MACHINE UNTIL YOU HAVE FOUND "G".



Item 12. Now the arrow is no longer necessary. Start playing at the first quarter-note. No background music.



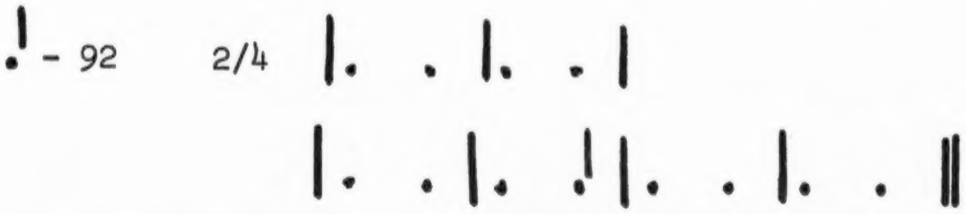
Item 13.



Item 14. Now you are ready to try a variation of the above training. Up to this point your response was begun on the FIRST beat of a specific measure, and you continued playing on each beat to the end.

Now you are asked to play only ONCE in each item, and on various beats within the measure. Play ONLY at the quarter-note.

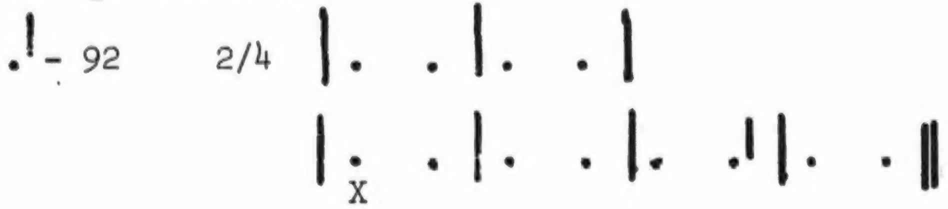
There will be the usual two measures of introduction.



Item 15.

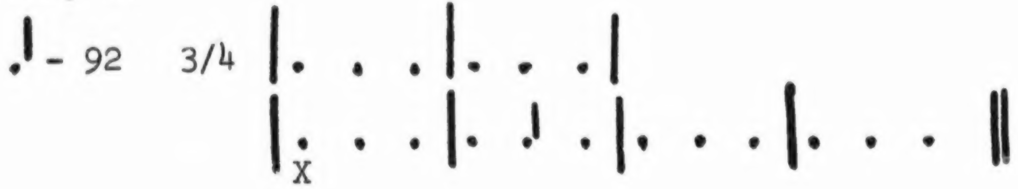
Play C.

The background music on the tape starts at X. You play only the quarter note.



Item 16.

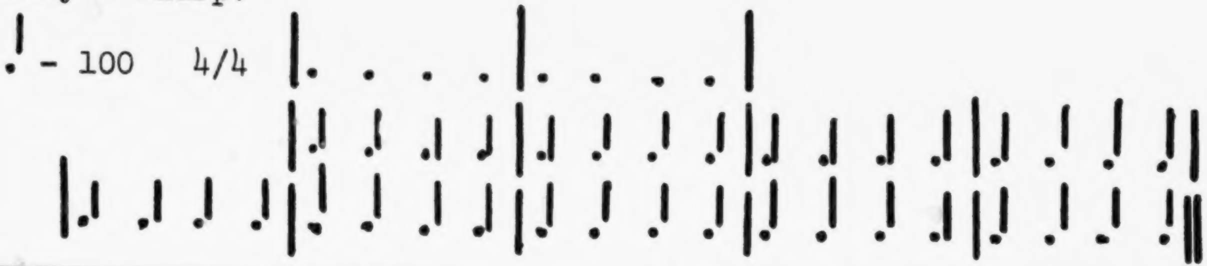
Play G.



Item 17. Until now you have heard the ticking of the metronome guiding you to the end of the item. Now the metronome will sound only through the introduction, and your response will be made without ticks in the background. The last tick will be the starting tap for you, on the first beat of the third measure.

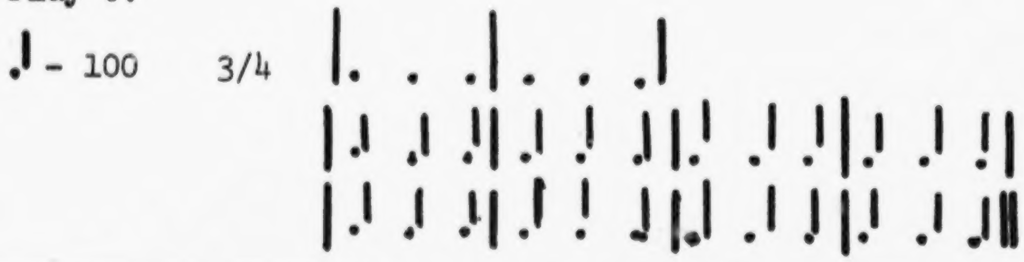
Listen and concentrate on the tempo of the introduction, and maintain this steady tempo to the end of the item. The background music will be your guide.

Play C-sharp.



Item 18. Let's try that in 3/4 time.

Play C.

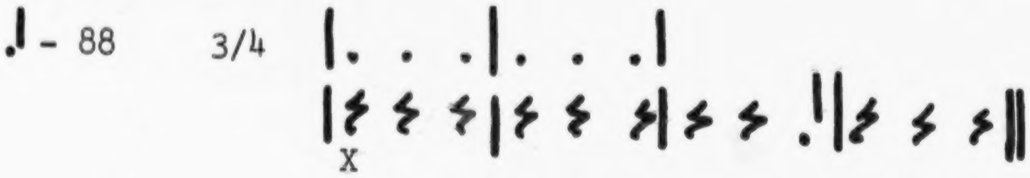


Item 19. The written symbol for a quarter-beat of silence is 𝄽 which is called a QUARTER-REST.

The introductory ticks announce the tempo which is maintained for the entire item by the background music. Listen carefully to the tempo of the background music while you count to yourself.

These next three items are short and each will be repeated as usual.

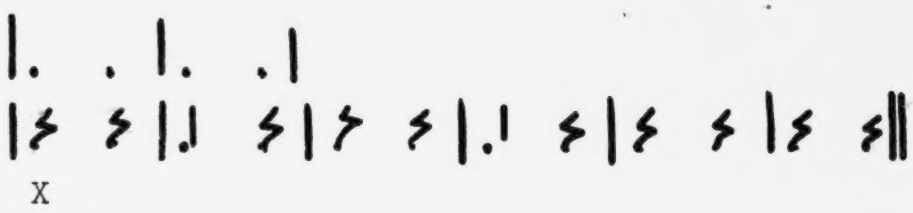
Play C.



Item 20. Until now you have been asked to tap only once in each item. Now you will have to tap TWO OR MORE TIMES in each item at the designated quarter-notes. As before, observe the time signature, and play each quarter-note at the proper time.

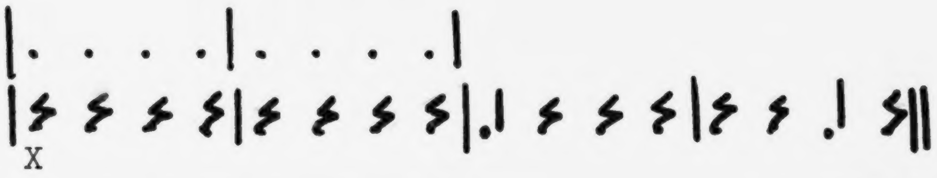
Play C

♩ - 88   2/4



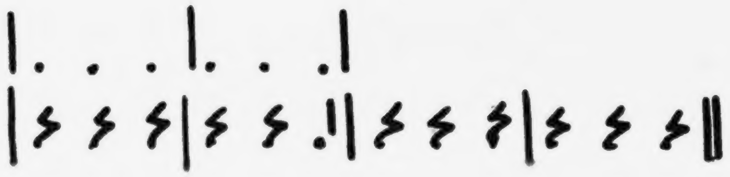
Item 21. Play G

♩ - 96   4/4



Item 22. Play B

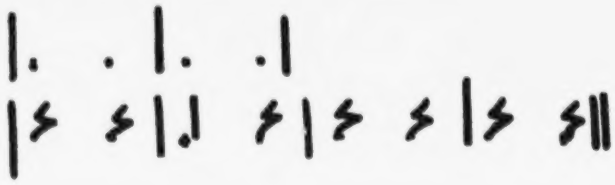
♩ - 92   3/ 4



Item 23. Now the patterns of the background music have changed, and no longer consist of only one note per beat. Your playing, however, is independent of these rhythm patterns, but must be done IN TIME with the tempo set by the metronome and the background music.

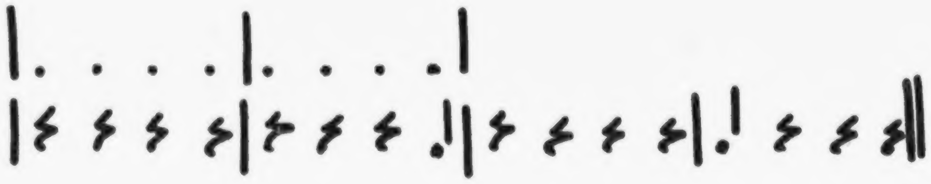
Play E

♩ - 92   2/4



Item 24. Play C

♩ - 108   4/4



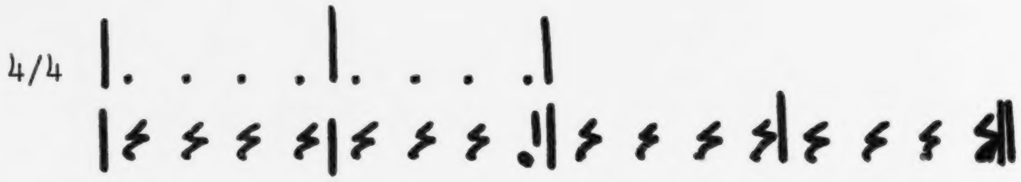
Item 25. We now continue with one or more notes played in each item, and a musical background.
The rate of speed (tempo) is established in two ways:

1. by the metronome marking (e.g. ♩ - 60) which in this case is one beat per second, and
2. by the two-measure introduction which has the metronome ticking at that tempo.

Remember that while the background melody often has more than one rhythmic attack within the beat, your part involves only quarter-notes and quarter-rests which are equal to one beat each.

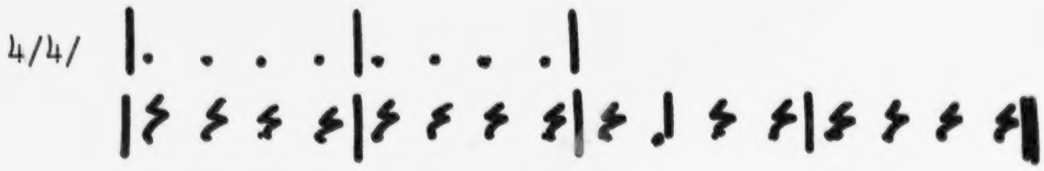
Play C

♩ - 96



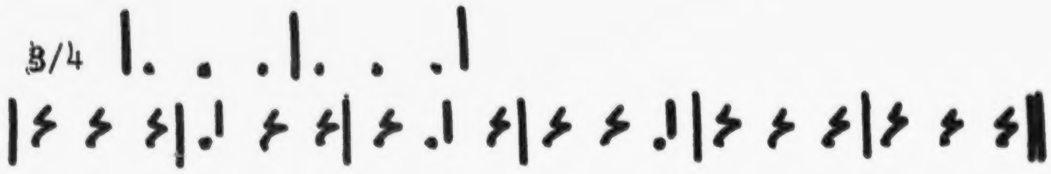
Item 26. Play B

♩ - 96



Item 27. Play G

♩ - 92

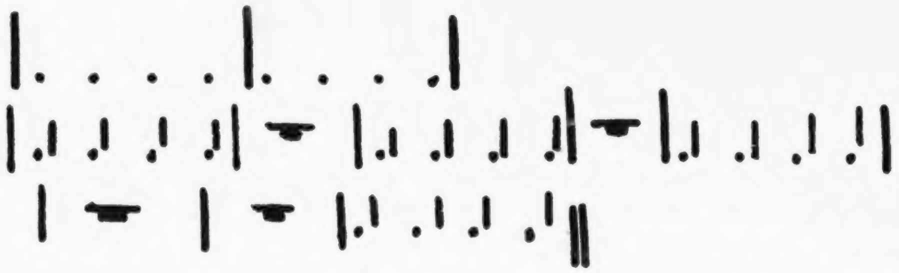


Item 28. Instead of using four quarter-rests to indicate a silent 4/4 measure, we can use a WHOLE-REST like this: ▬

You will now have to remember the meter (time signature) at the beginning of each item in order to know how many beats are in each measure. Before this you had one symbol, either a note or a rest, for each beat. Now one symbol, the WHOLE REST, may represent four beats.

Play G

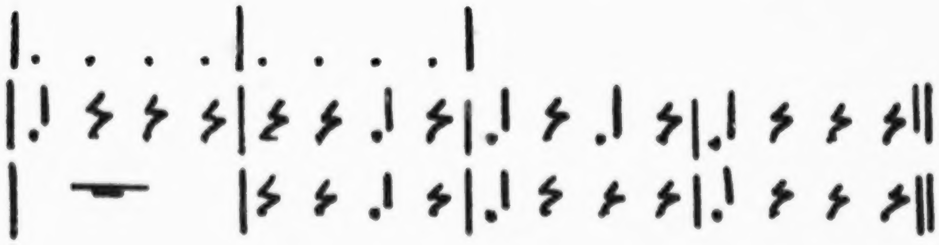
♩ - 108 4/4



Item 29. Observe the time signature, quarter-rests, and whole-rests, playing each quarter-note at the proper time.

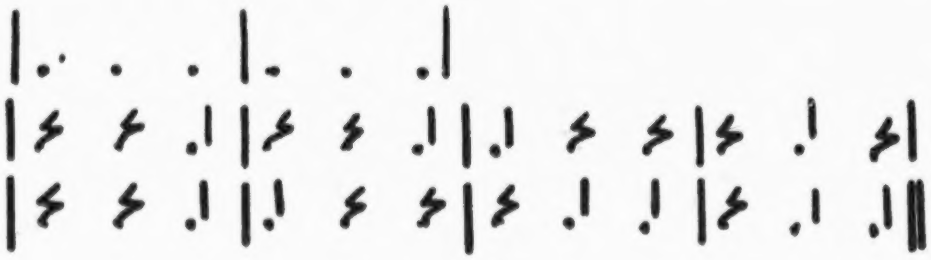
Play C

♩ - 116 4/4

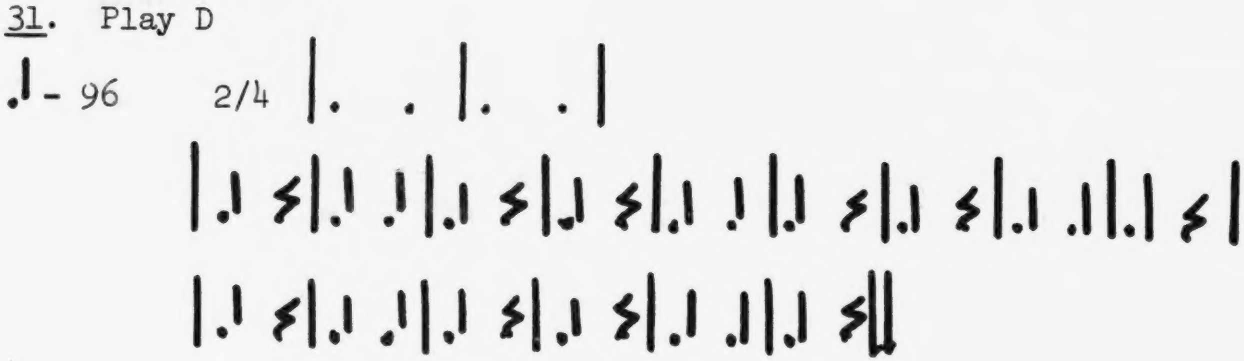


Item 30. Play G

♩ - 92 3/4

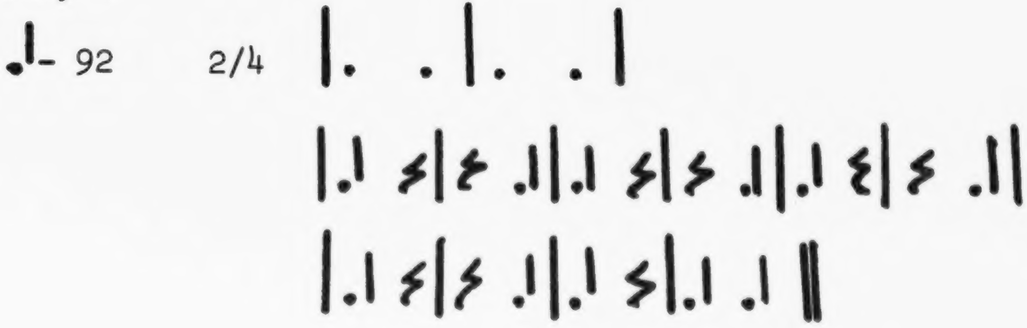


Item 31. Play D

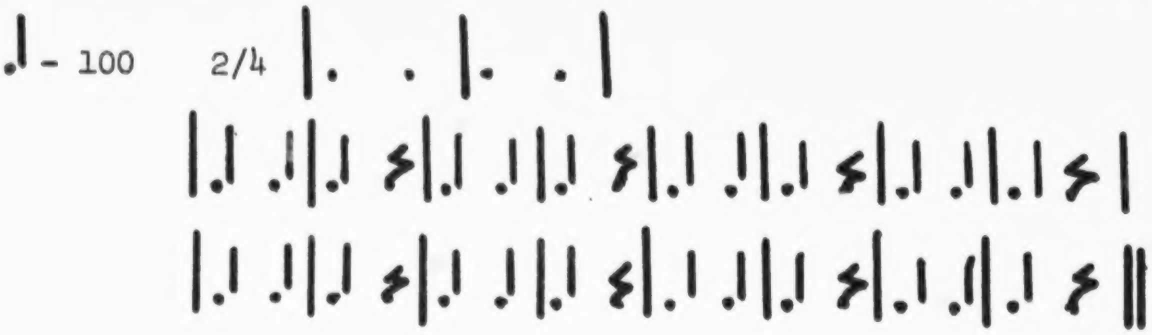


Item 32. Now the melody in the background will not begin on a first beat in a measure as before, but on the last beat of the second introductory measure. This is called an UP-BEAT. You begin to play at the beginning of the third measure as usual.

Play B

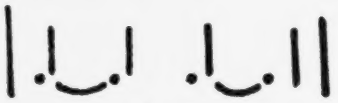


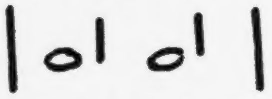
Item 33. Play D



RHYTHMS

You have been playing the keys at specified times. Actually you have been playing rhythms. The notation, however, has shown each of the beats in a measure, and also shown at which points the notes are to be played. The notation will now be changed by using notes indicating LENGTH or DURATION in terms of the number of beats contained in each note.

Two quarters connected by a tie: 

A half-note instead of two tied quarters: 

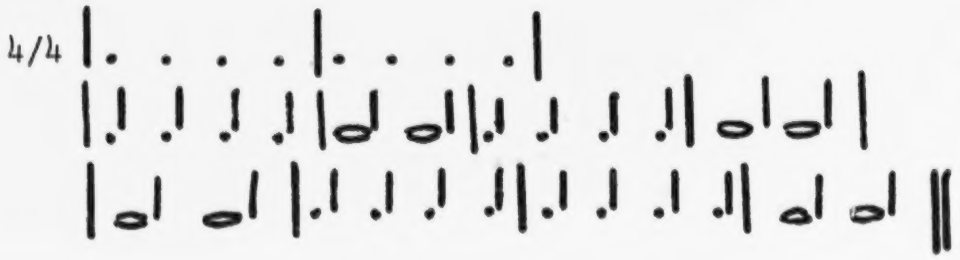
Now there is only ONE SYMBOL FOR EACH TAP; every note you read must be played. A single HALF-NOTE represents two beats which you play with a single tap.

Item 34. ♩ - 72

Start the tape. The metronome will tick quarter-beats throughout the item. No background music.

Play any key.

♩ - 72

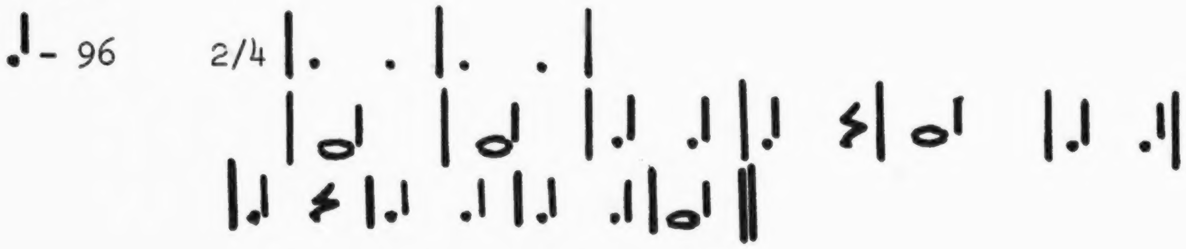


Item 35. You are now ready for training in simple rhythms. Notes will be one beat long or two beats long.

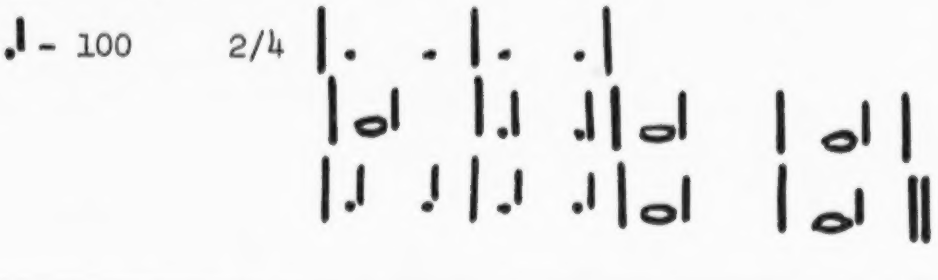
The next five items are in TWO-FOUR METER, and each measure will contain either a HALF-NOTE (𝅗𝅥), two QUARTER-NOTES (♩♩), or one QUARTER-NOTE and a QUARTER-REST (♩ 𝄽).

Each item will begin with two measures of metronome ticks to give you a feeling for the tempo. Begin to play at the first note and continue playing only once for each written note.

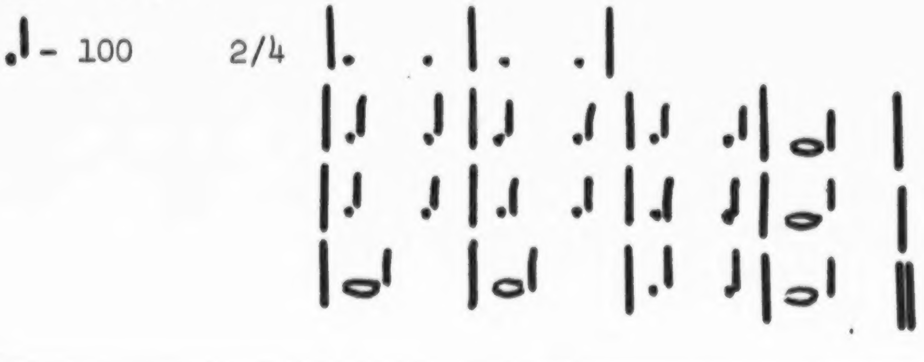
Play D



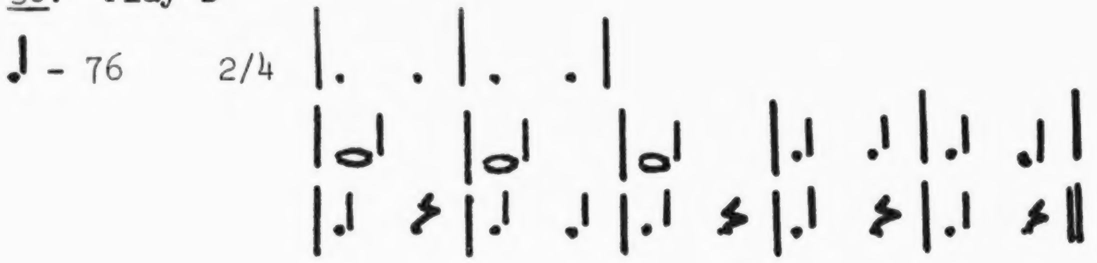
Item 36. Play D



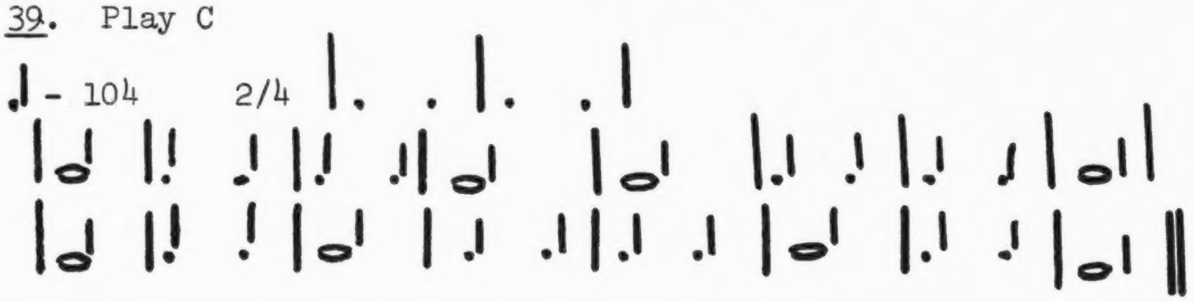
Item 37. Play F

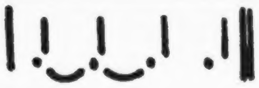


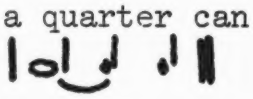
Item 38. Play B

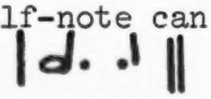


Item 39. Play C

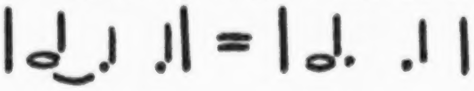


Item 40. Three quarters can be connected by ties: 4/4 

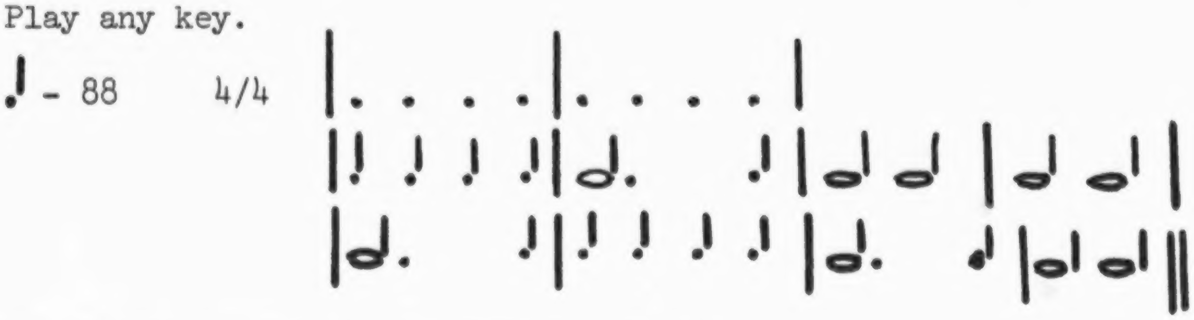
A half-note tied to a quarter can be used instead of three tied quarters. 4/4 

A dotted half-note can be used instead of either of the above: 4/4 

Remember, a dot after a half-note means the same as tieing a quarter-note to that half-note. For example:

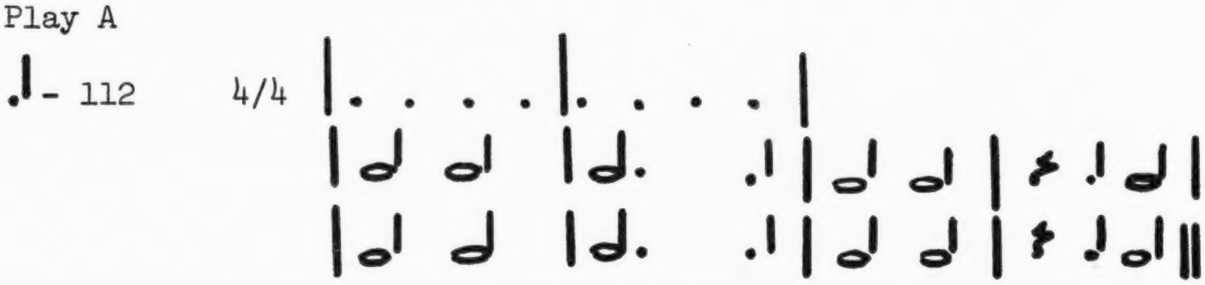
4/4 

Play any key.



Item 41. The dotted half-note has three beats.

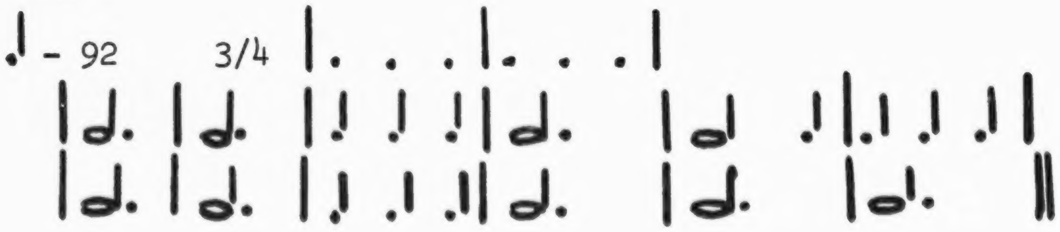
Play A



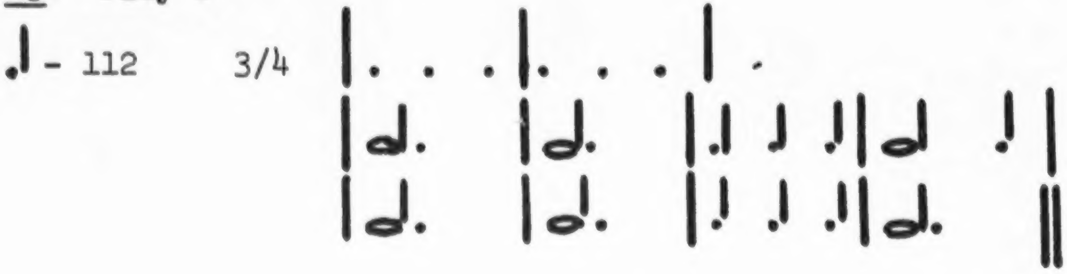
Item 42. We now proceed to items in THREE-FOUR meter, with three beats in each measure. The next group will contain notes, and omit rests. The following groups are found:

Dotted-half (𝅗𝅥.), three quarters (♩ ♩ ♩),
half and quarter (𝅗𝅥 ♩).

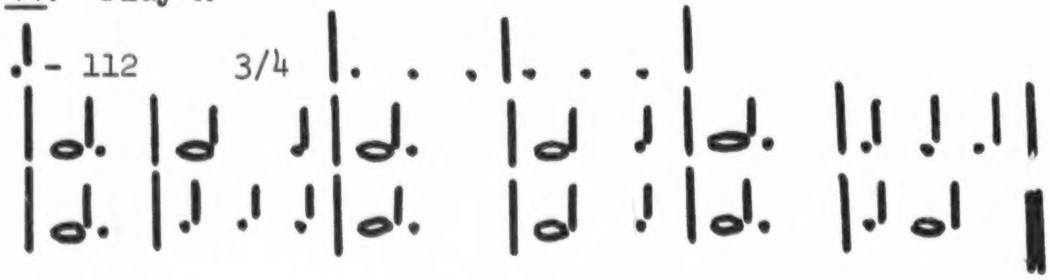
Play D



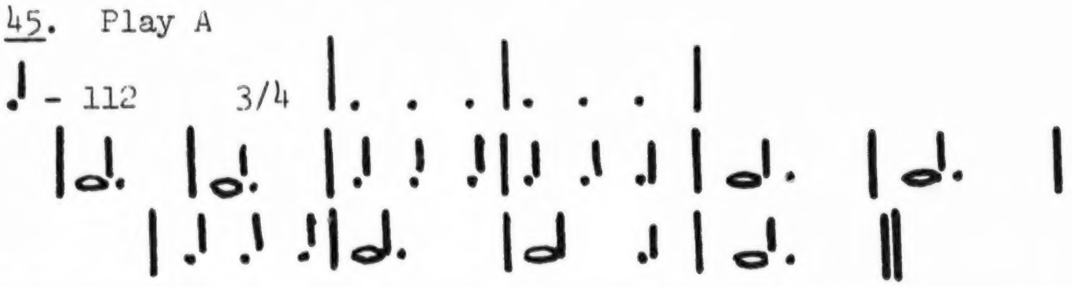
Item 43. Play D

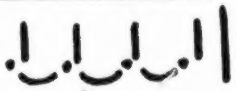


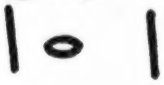
Item 44. Play A

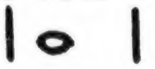


Item 45. Play A

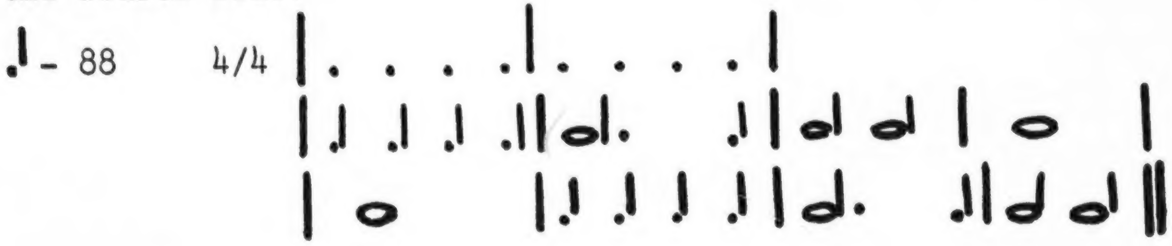


Item 46. Four quarters can be connected by a tie: 4/4 

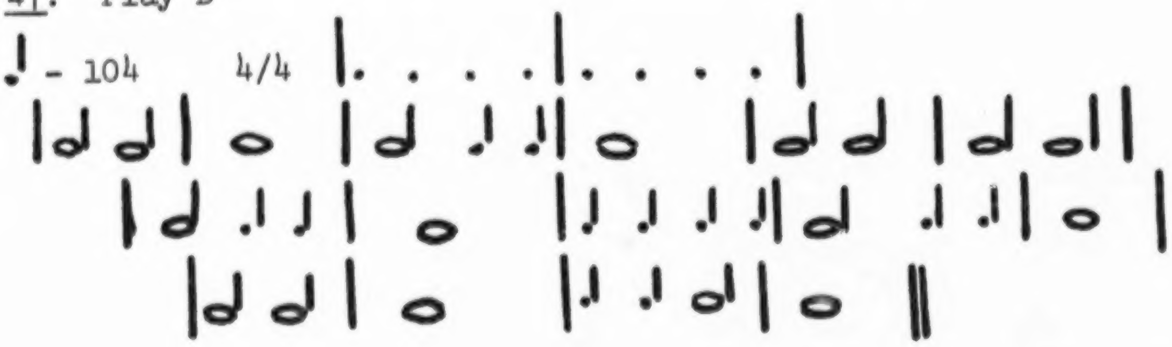
A whole note can be used instead of four tied quarters: 

A single whole-note represents four beats of continuous sound. To play this whole-note 4/4 

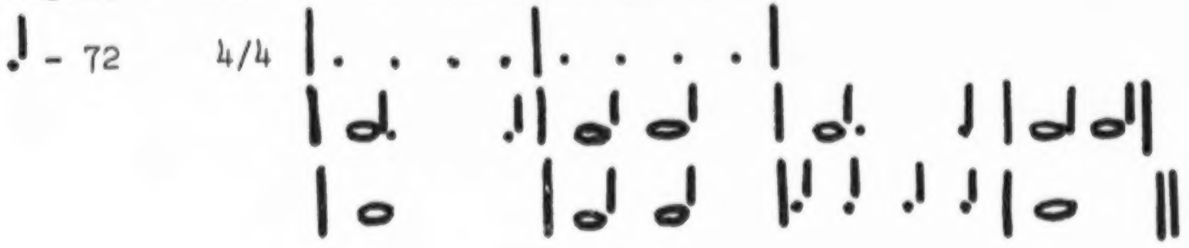
press the key down on the first beat and hold it down through the fourth beat.



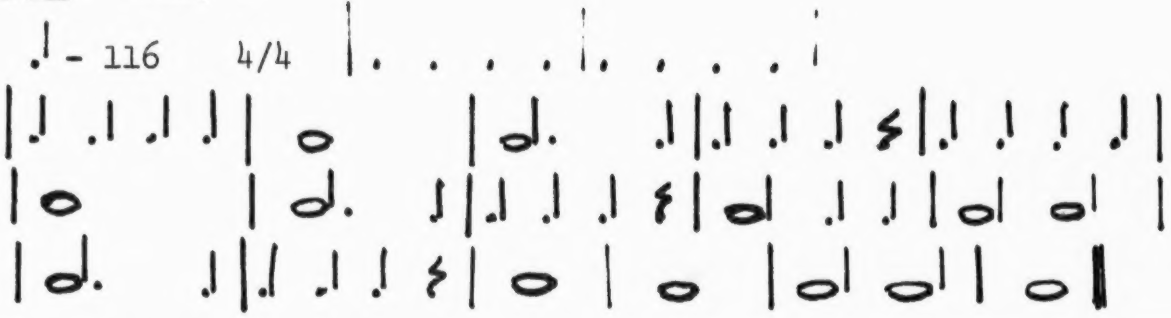
Item 47. Play D



Item 48. Play A. The background melody begins one beat after you begin, on beat two of the third measure.



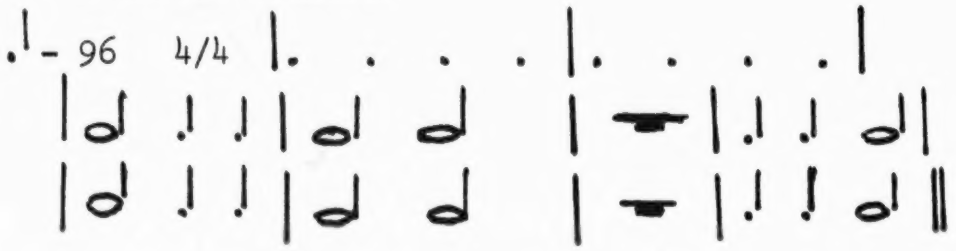
Item 49. Play B



Item 50. The whole-rest represents four beats of silence in 4/4 meter, and looks like this: ▬

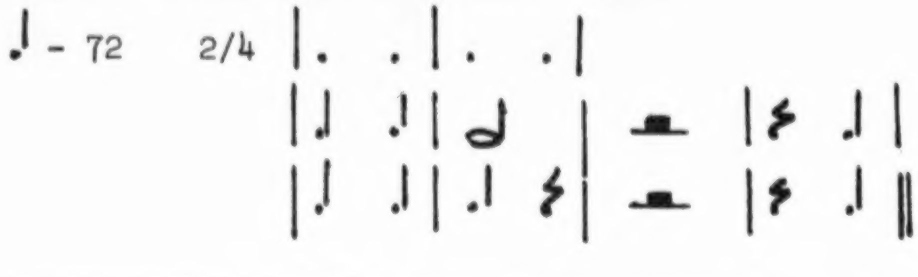
Be sure you continue hearing the four beats although you do not play for an entire measure.

Play C

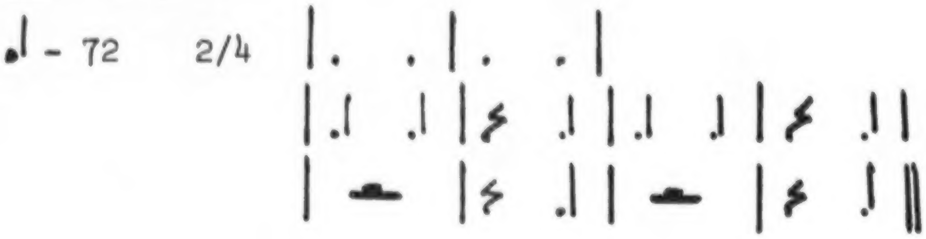


Item 51. In 2/4 time, an entire measure of silence is indicated by a half-rest, which looks like this: ▬

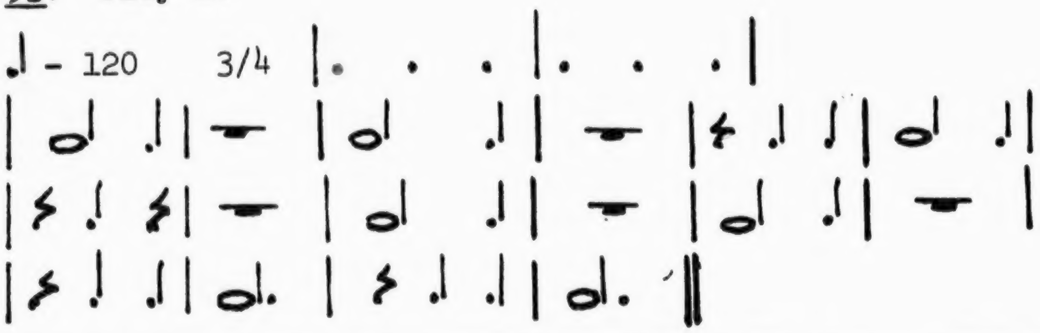
Play D



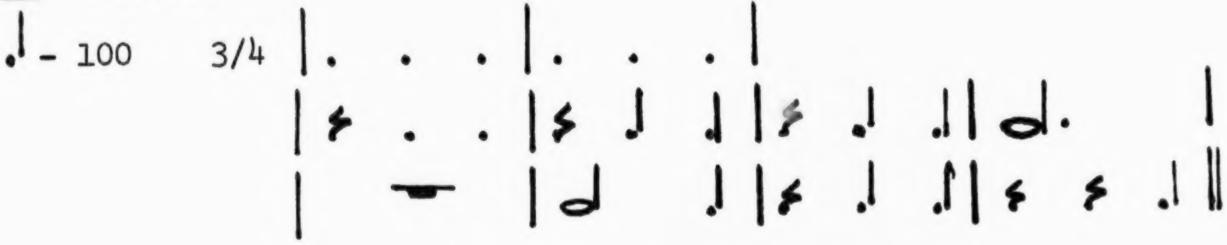
Item 52. Play F.



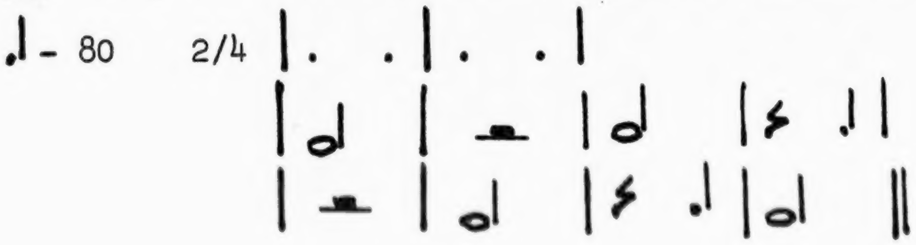
Item 53. Play E.



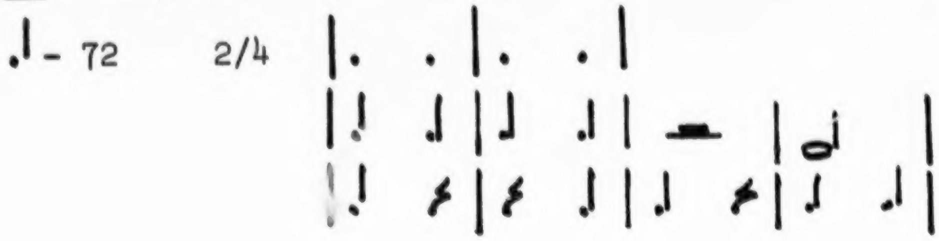
Item 54. Play B.



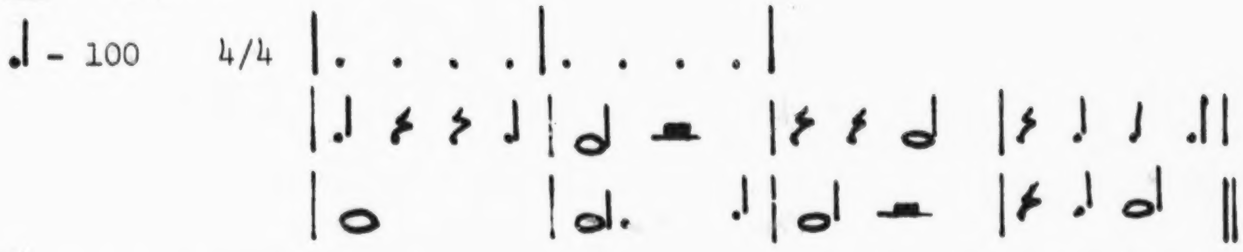
Item 55. Play C. The HALF-REST represents two beats:



Item 56. Play A

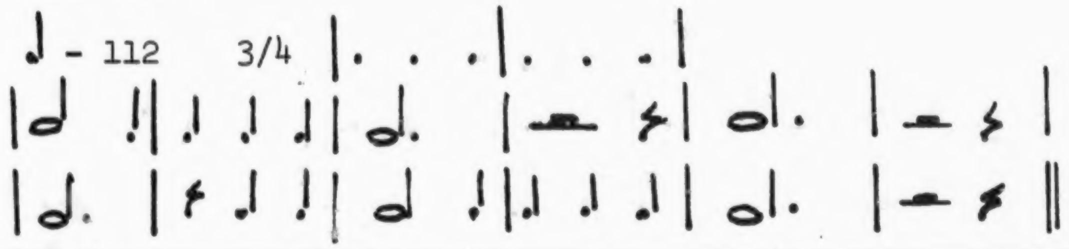


Item 57. Play B.

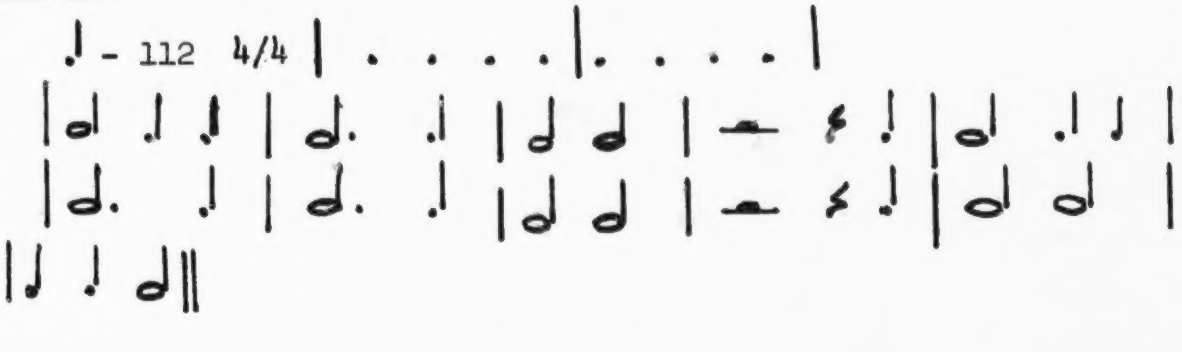


Item 58. The half-rest and quarter-rest together represent three beats. In 3/4 time this would fill a complete measure. Remember that the whole-rest will also fill a complete measure of 3/4 time.

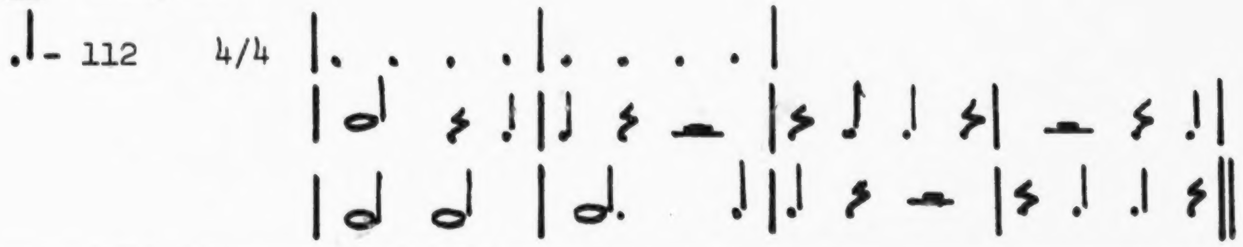
Play C.



Item 59. Play A.

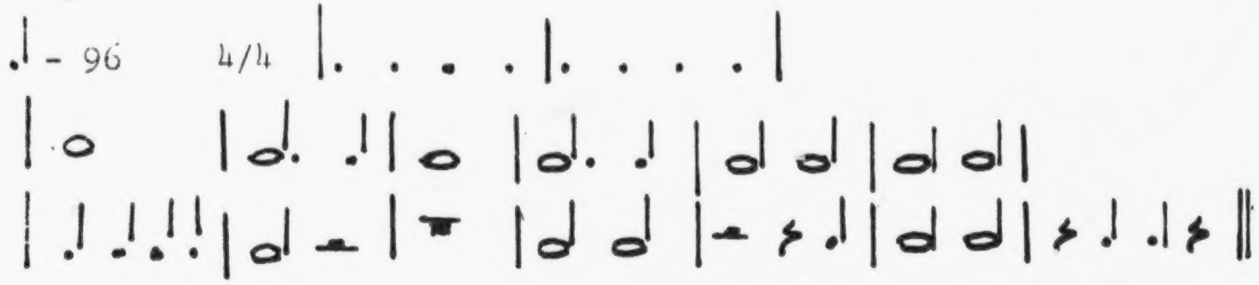


Item 60. Play D.

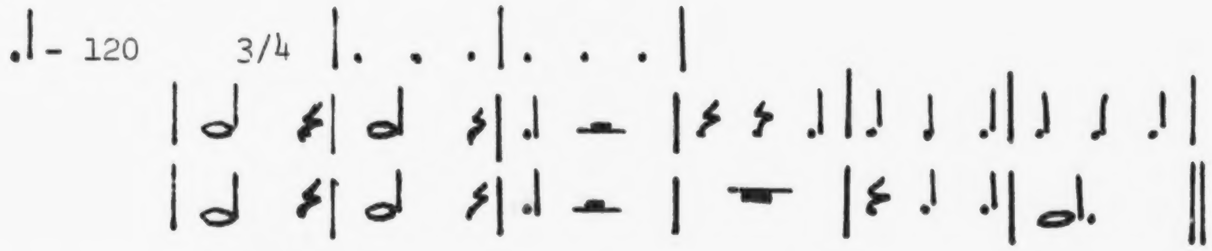


Item 61. The next three items will contain combinations of half-rests, whole rests, and quarter rests. Notice that the whole and half-rests look very similar, except that the whole-rest lies just below the line, and the half-rest just above the line.

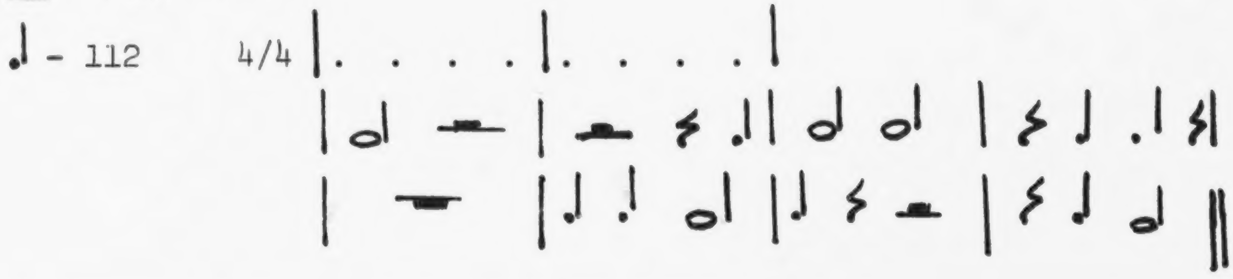
Play A.



Item 62. Play G.



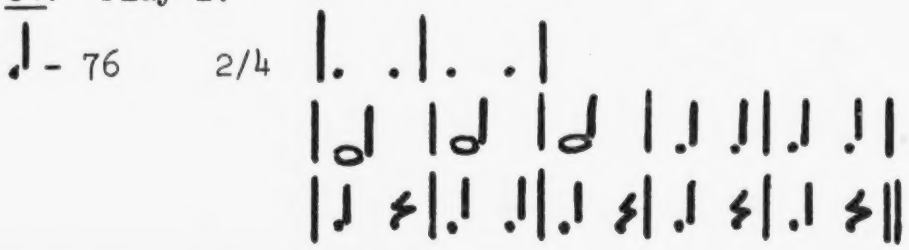
Item 63. Play C.



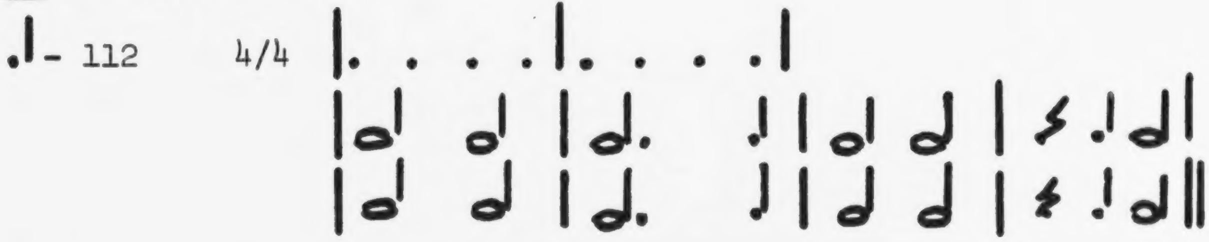
REVIEW

The next ten items will review half-notes and rests, dotted half-notes and rests, and whole notes and rests.

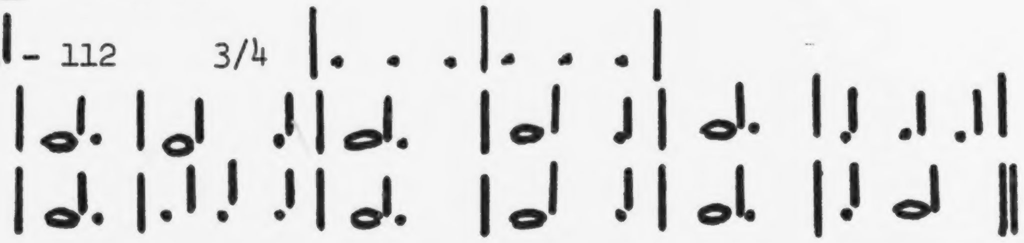
Item 64. Play B.



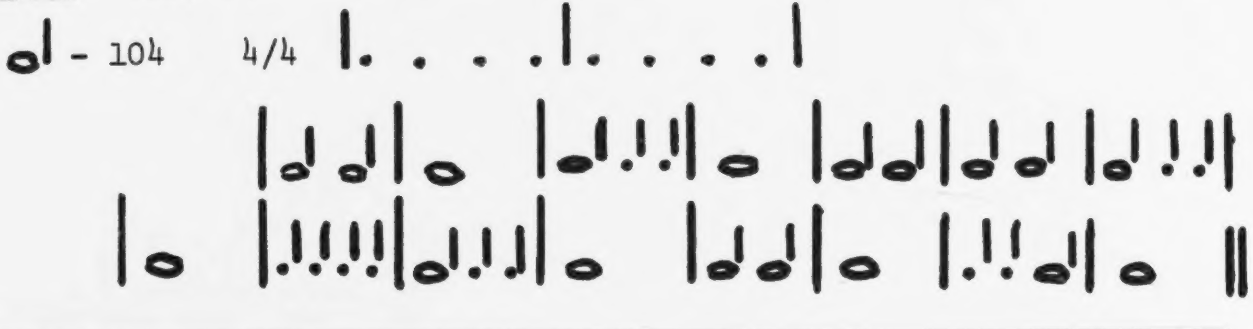
Item 65. Play A.



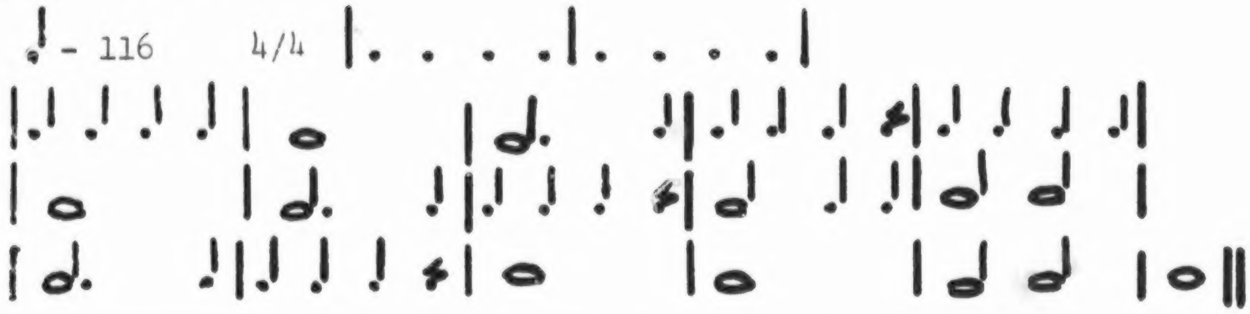
Item 66. Play A.



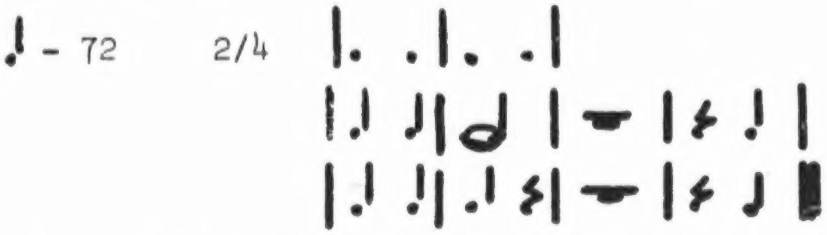
Item 67. Play D.



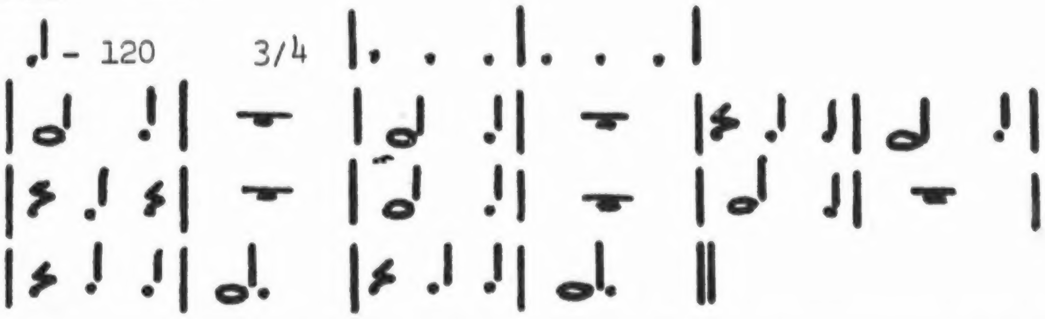
Item 68. Play B



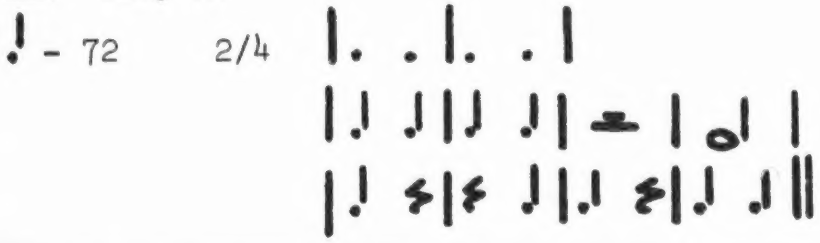
Item 69. Play D.



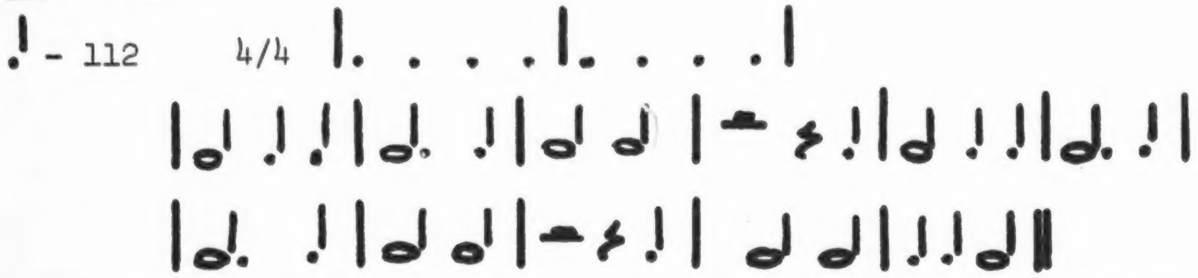
Item 70. Play E.



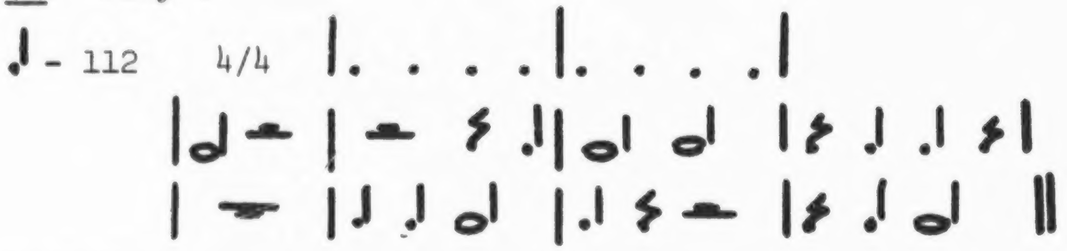
Item 71. Play A.



Item 72. Play A



Item 73. Play C



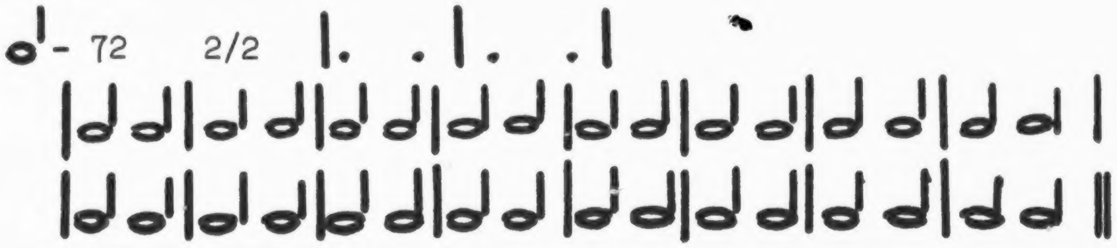
END OF REVIEW

Item 74. In all of the first 73 items we have used the quarter-note as a beat. Thus in 4/4 meter we had four beats in a measure, and each beat was a quarter-note in length. The tempo indication, for example, was ♩ - 92 which indicated the rate of speed of the quarter-note beats.

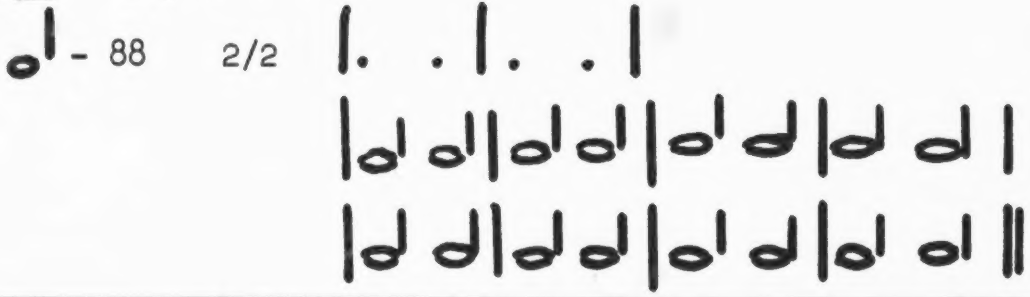
Now we will use the HALF-NOTE as the beat, again in groups of two, three, or four. The meter signatures will be 2/2, 3/2, or 4/2. Notice that the lower figure of the fraction is now 2, showing that the beat is a half-note in length.

Each dot representing a tick in the two measures of introduction now represents a half-note beat.

Play A

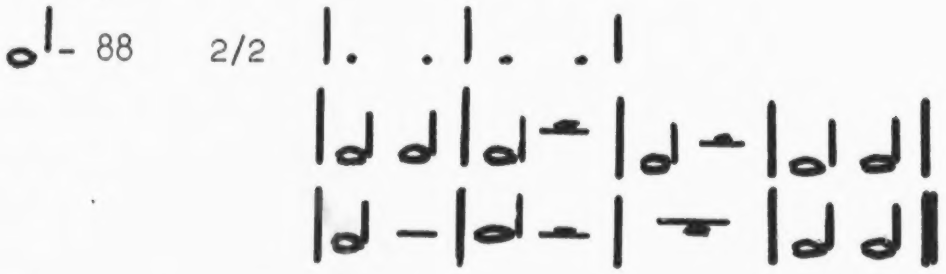


Item 75. Play A



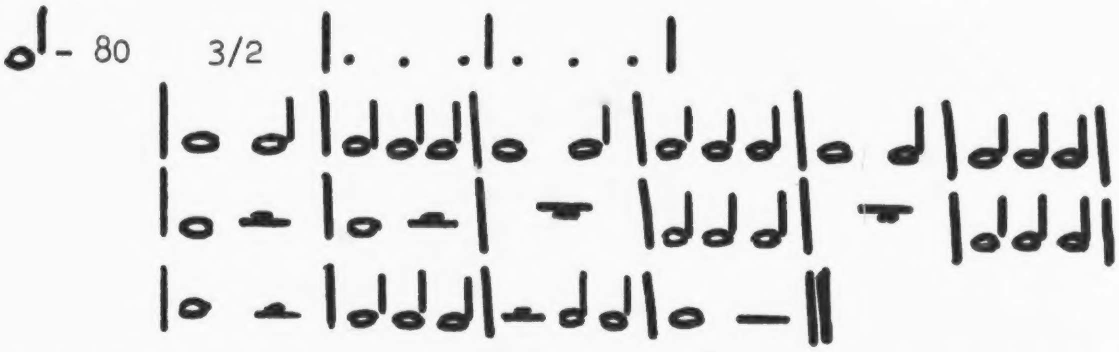
Item 76. Half-rests are now also one beat long, and whole-rests are two beats long.

Play A



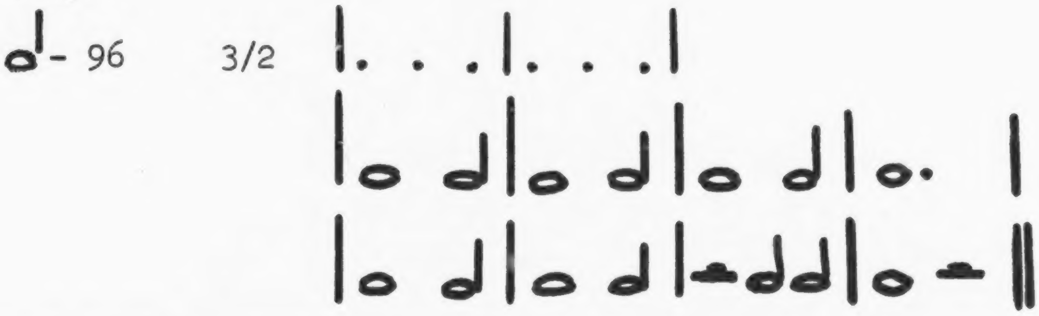
Item 77. Since the HALF-REST gets one beat, the WHOLE-REST will get two beats. If a measure of 3/2 contains only the whole-rest, this rest is actually three beats long.

Play E



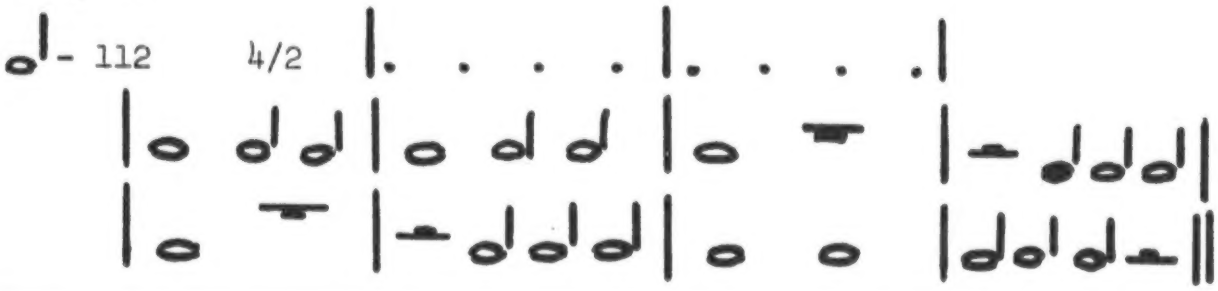
Item 78. The dotted whole-note is a combination of the whole-note and a half-note, filling a complete measure in 3/2 time.

Play D

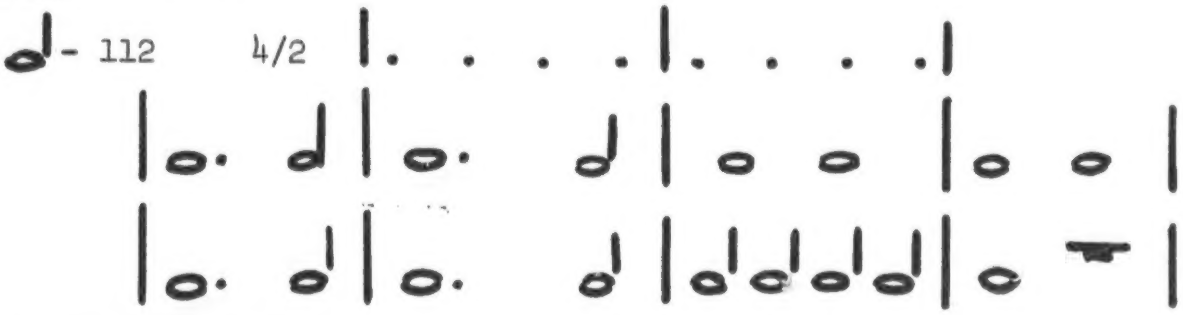


Item 79. The dotted whole-note now gets three beats, and in 4/2 meter an added half-note or half-rest will fill the four beats in a measure.

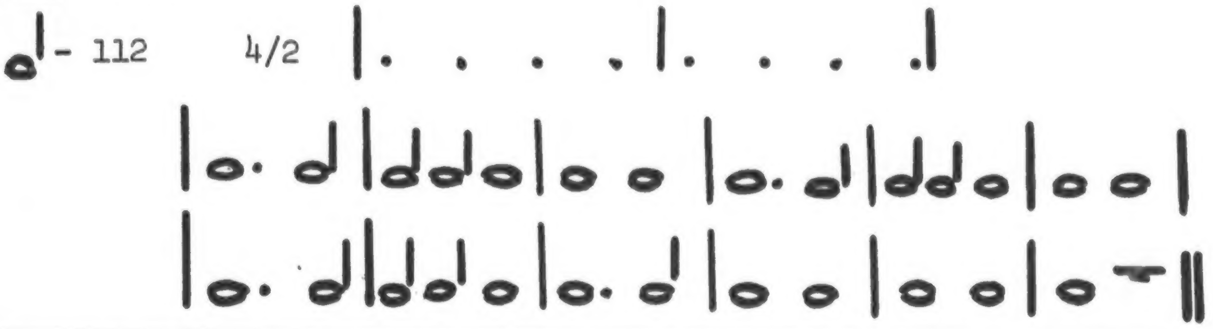
Play C.



Item 80. Play B.



Item 81. Play E.

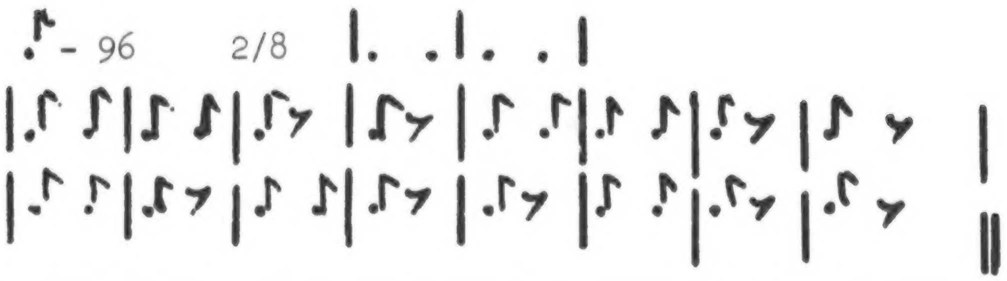


Item 82. We have now had examples in 2/4, 3/4, and 4/4 meter in which the quarter-note was the beat. We have also had examples in 2/2, 3/2, and 4/2 meter in which the half-note was the beat.

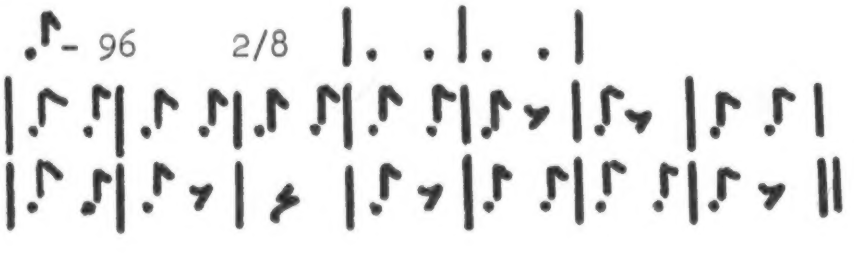
We can also have beats an eighth-note long. The eighth-note looks like this (♪) by adding a flag to the stem of the quarter-note. The eighth-rest looks like this: (𝄾).

Two-eight meter then would have two beats in a measure with the eighth-note getting one beat.

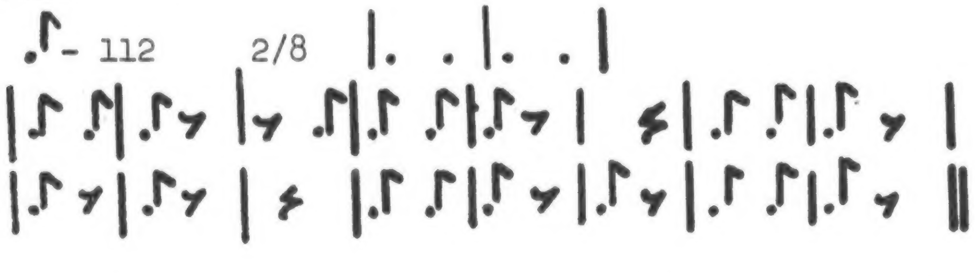
Play D



Item 83. Play E



Item 84. Play D

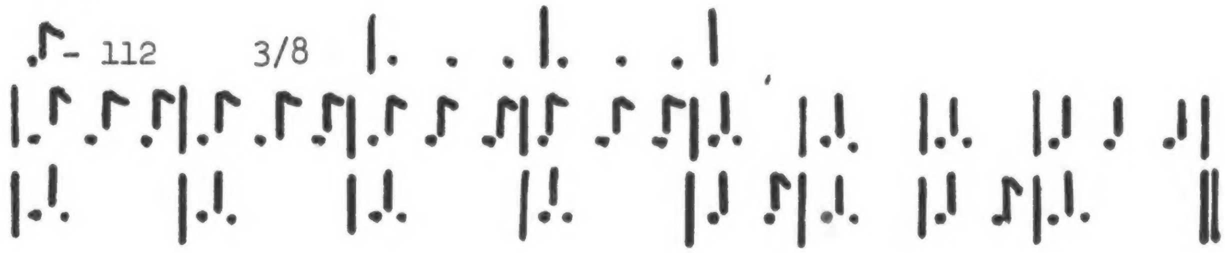


Item 85. Three-eight meter would indicate three eighth-note beats in each measure. These combinations are possible:

Three eighths (♪ ♪ ♪), quarter and eighth (♩ ♪),

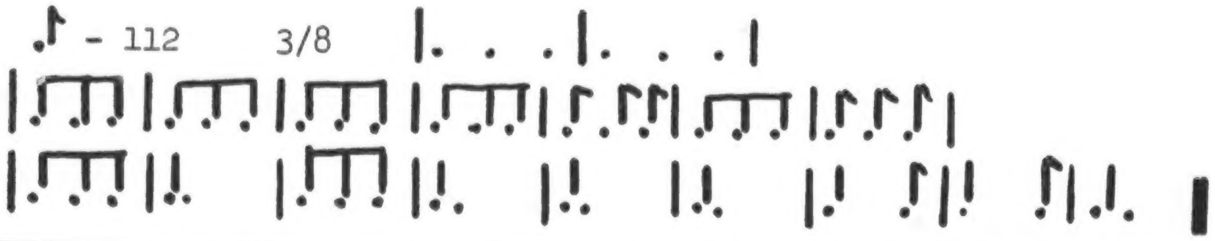
and a dotted quarter (♩.) to fill a measure.

Play A

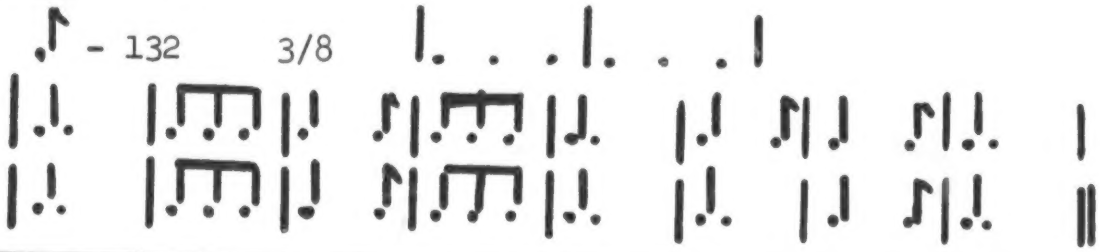


Item 86. Eighth-notes with separate flags (♪ ♪ ♪) may be combined (♫).

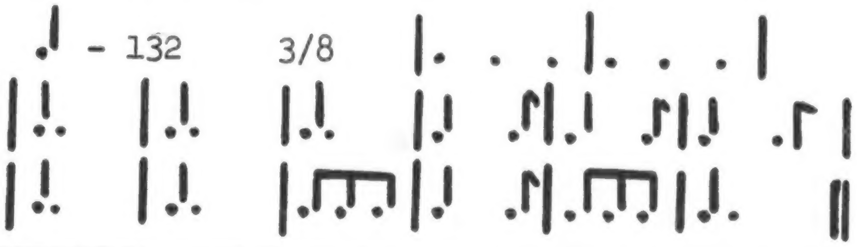
Play E.



Item 87. Play C.



Item 88. Play A.

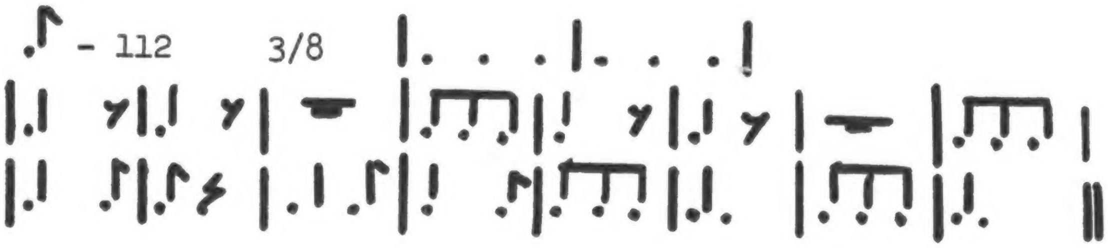


Item 89. Rests in 3/8 time will follow a similar pattern. These are the possibilities:

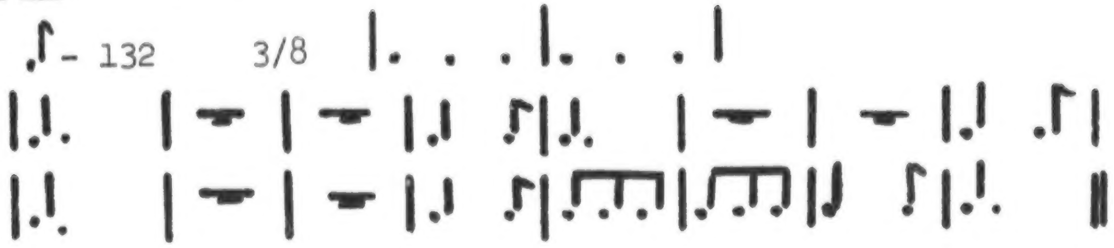
Three eighth-rests (𝄾 𝄾 𝄾), quarter and eighth (𝄽 𝄾),

dotted quarter (𝄽.), or whole-rest (𝄻).

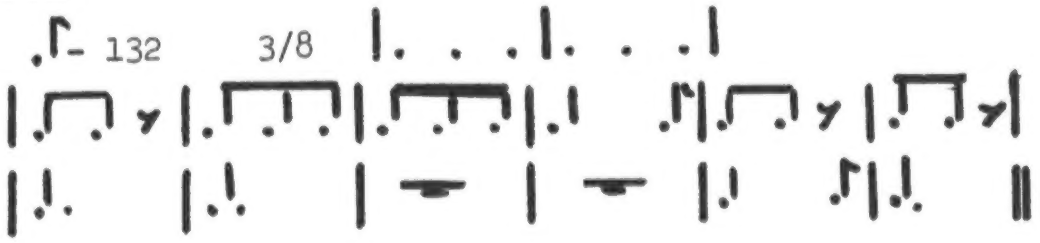
Play E.



Item 90. Play C.

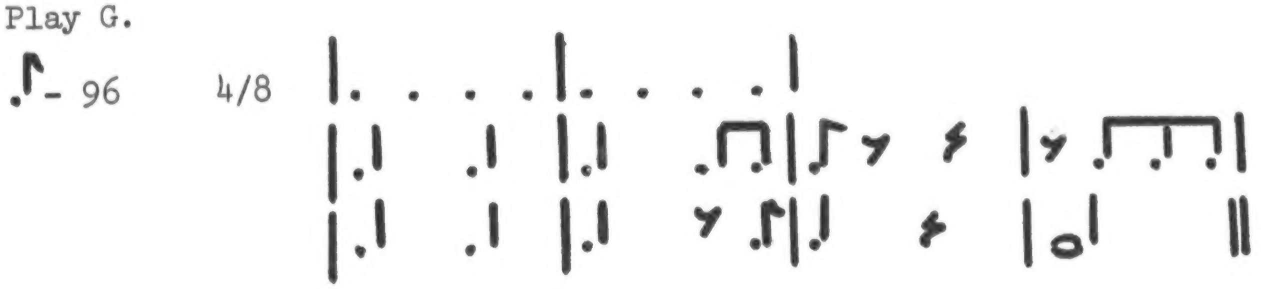


Item 91. Play A.



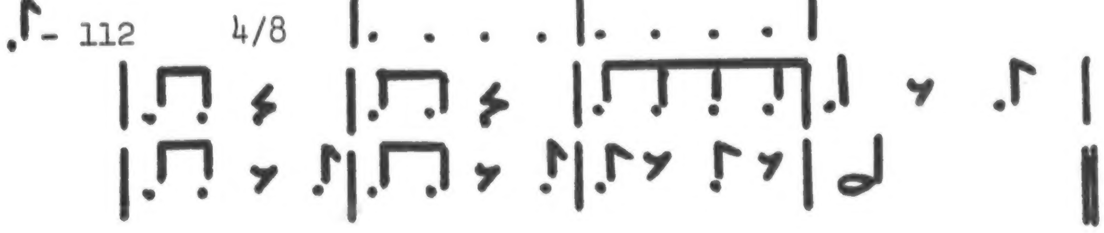
Item 92. In 4/8 meter we have four beats, each an eighth in length.

Play G.



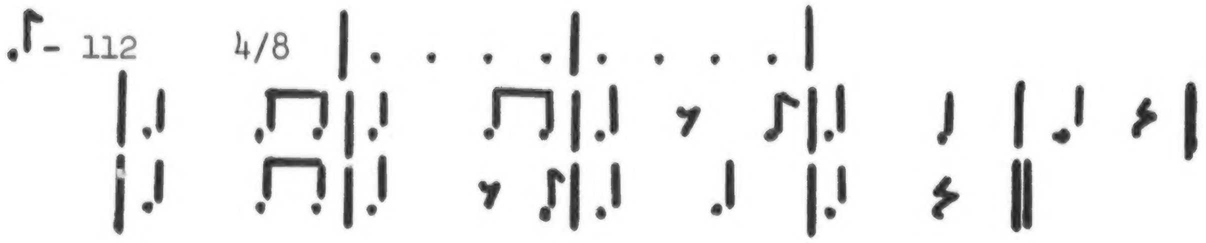
Item 93. In this item the background music begins on the third beat of the second measure, but you are to begin as indicated on the first beat of the third measure.

Play B-flat.

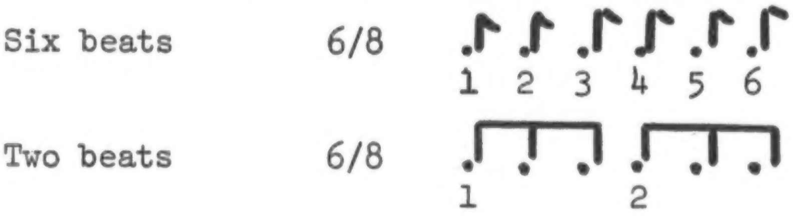


Item 94. In this item the melody begins AFTER you have played your first note.

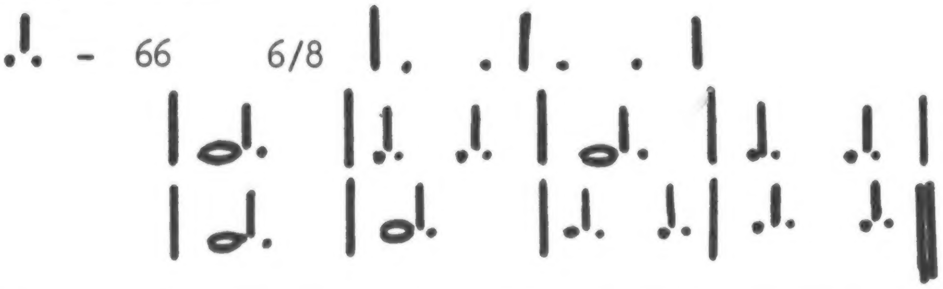
Play C



Item 95. In earlier items you have played in 6/8 time, using the eighth-note as a beat. In more rapid music, the dotted-quarter is used as a beat. This gives two beats in 6/8 time. Rhythms will look and sound as they did before, but the number of impulses in a measure are now two instead of six. Examine the following diagram:

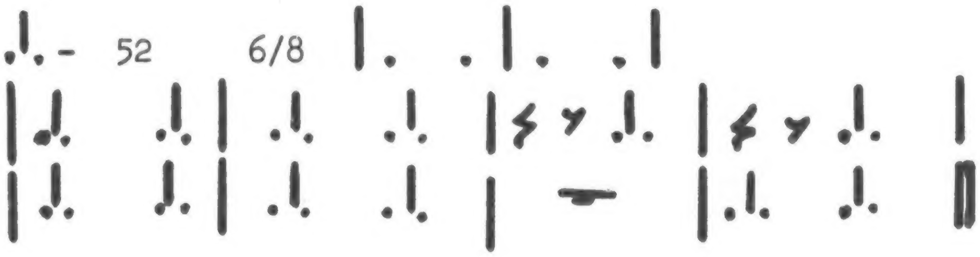


Play E-flat

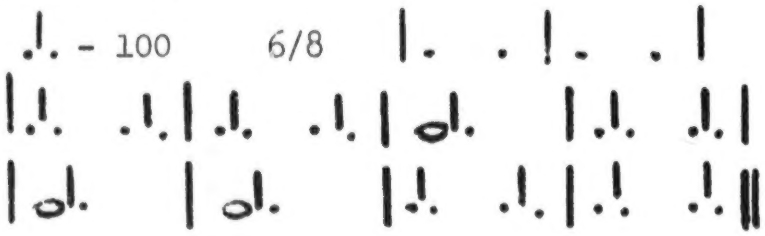


Item 96. In one beat, the dotted quarter contains a quarter and an eighth. The quarter-rest and eighth-rest together also form one beat.

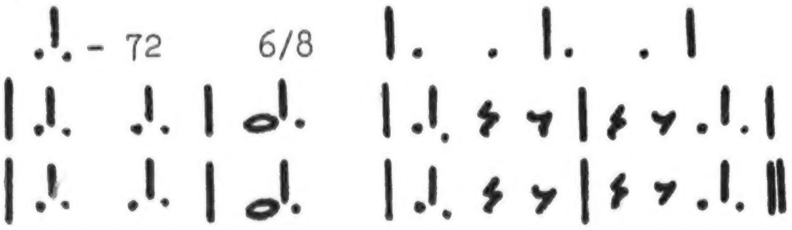
Play E



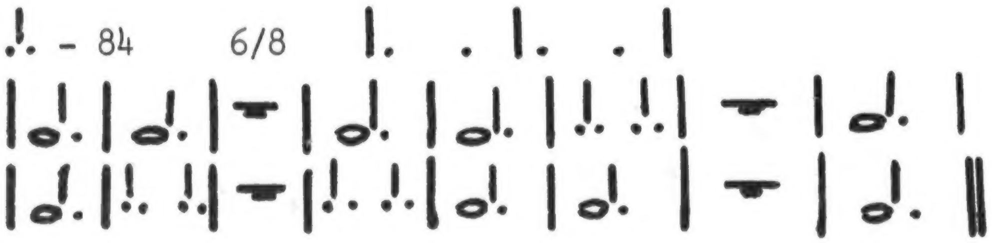
Item 97. Play E



Item 98. Play E

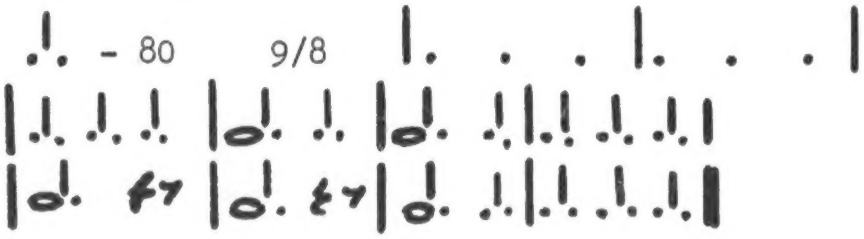


Item 99. Play G.

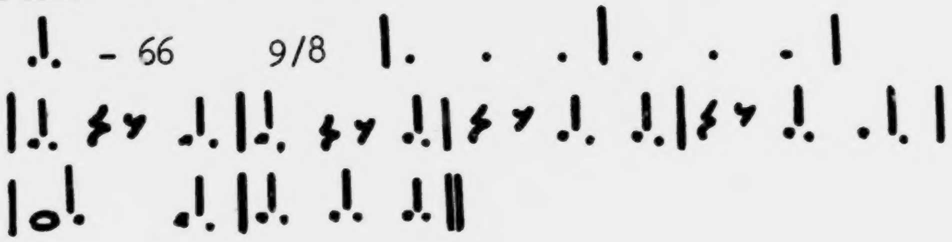


Item 100. In 9/8 meter we have three beats, each consisting of a dotted quarter.

Play E-flat.

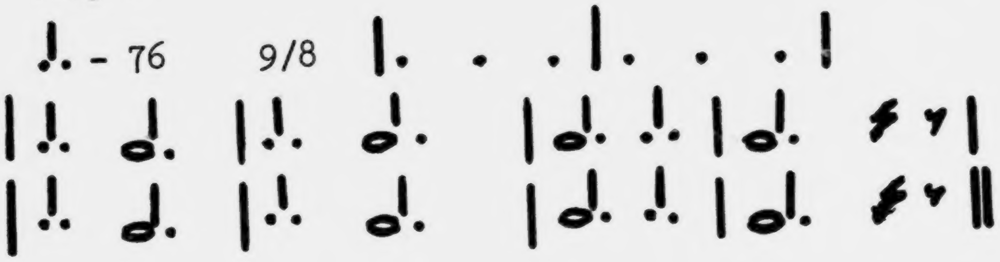


Item 101. Play B-flat

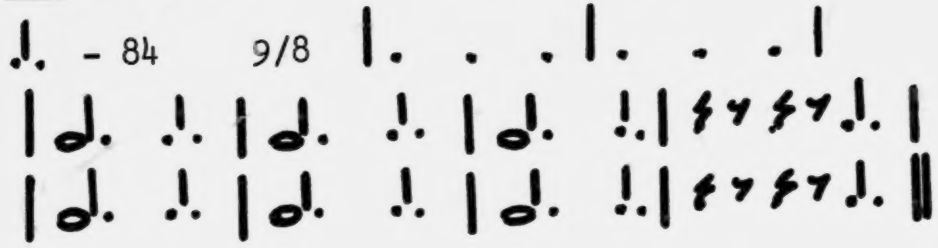


Item 102. Here the melody begins on a part of the second beat. Listen carefully. You may need to repeat this item.

Play F

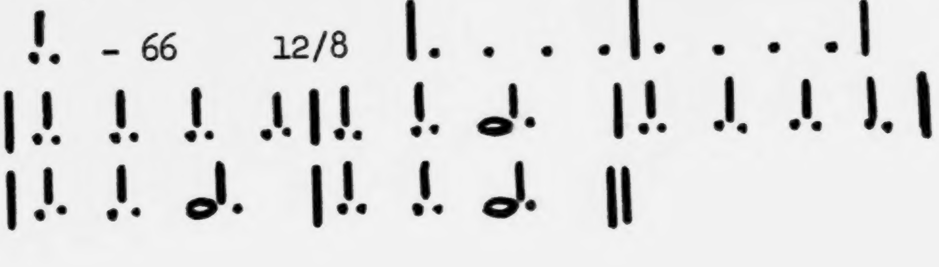


Item 103. Play G

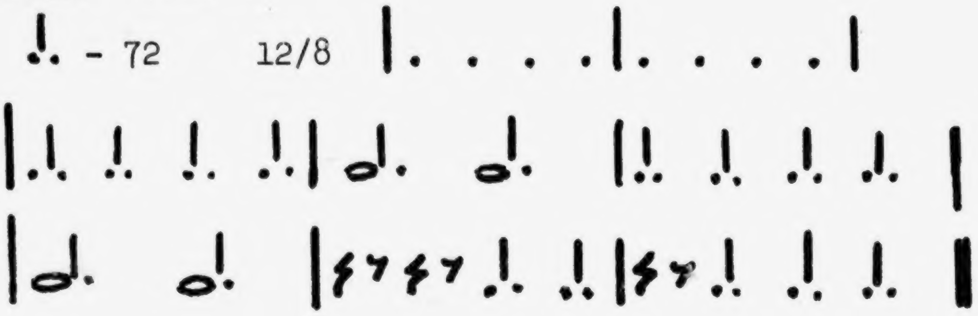


Item 104. Extending the idea of the dotted quarter-beat one step further, we have 12/8 meter with FOUR dotted-quarter beats.

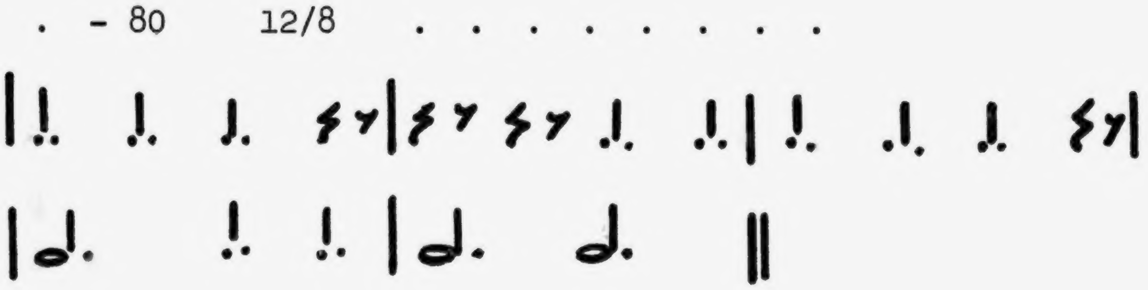
Play A



Item 105. Play E



Item 106. Play G



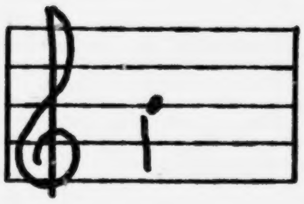
REVIEW

The next twenty-five items are chosen from the material of the previous items. As you proceed through this section, you will be presented with pitch notation as well as the rhythm notation.

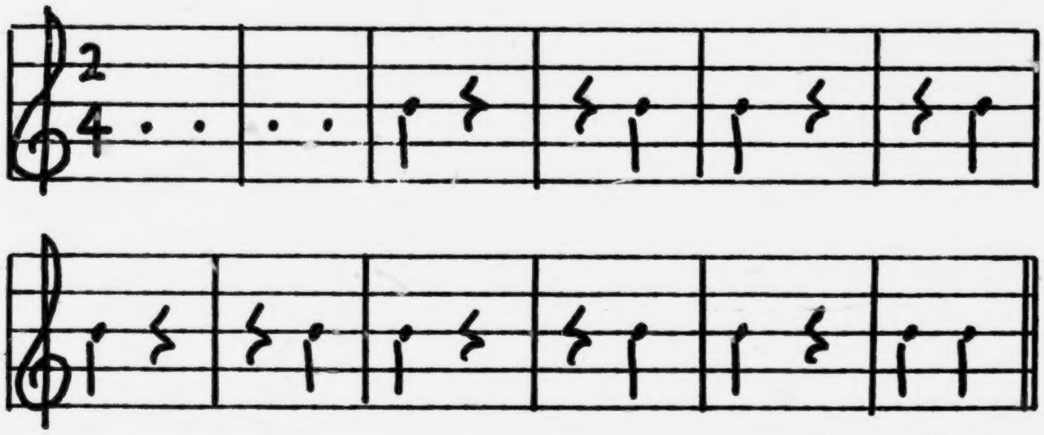
You will be told which note to play, and shown the symbol for that note. The training item will appear on the music staff. Notice that the two measures of introduction now appear directly ahead of the measure in which you begin to play.

Find the indicated key on the keyboard, and play the rhythms just as you did before.

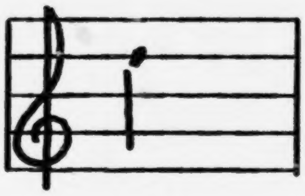
Item 107. Play B



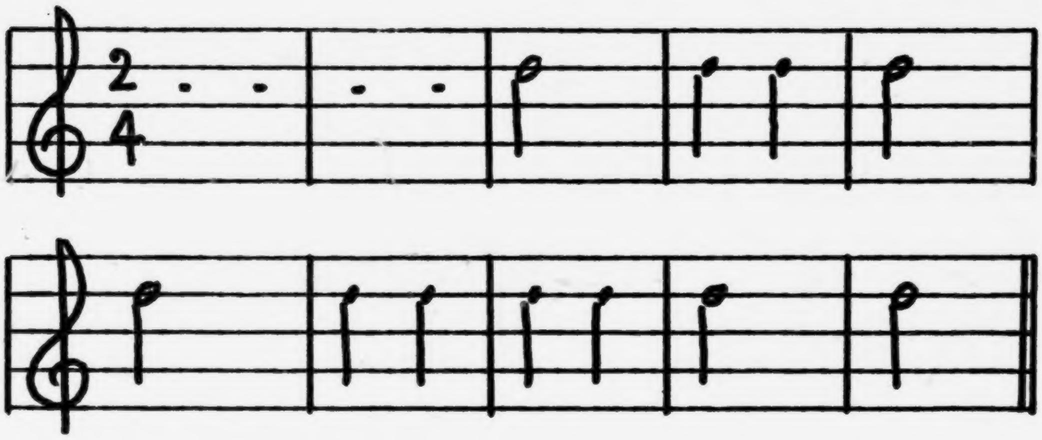
♩ _ 92



Item 108. Play D

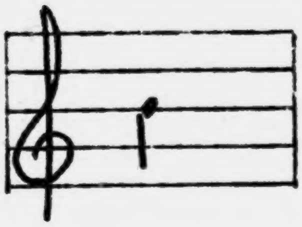


♩ - 100

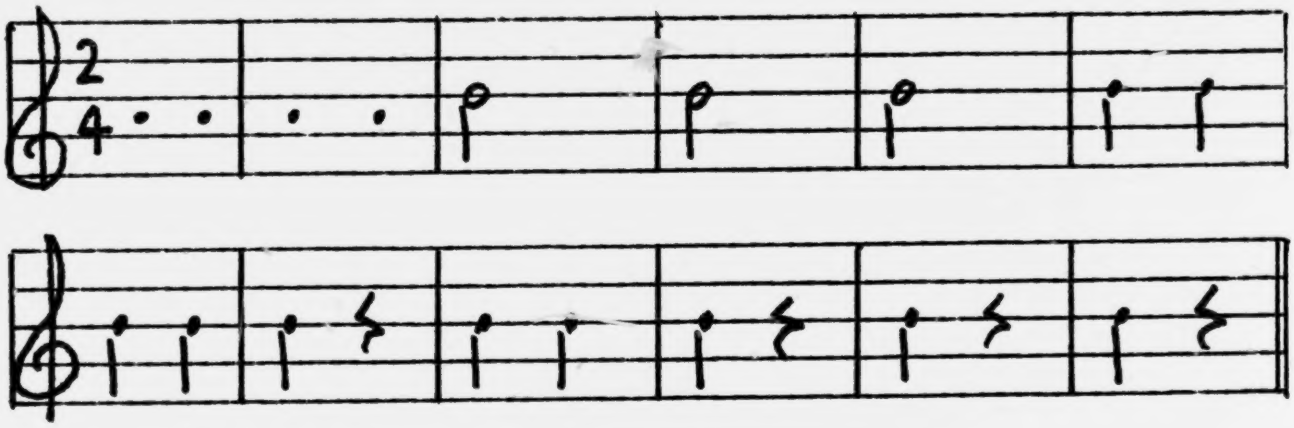


Item 109.

Play B

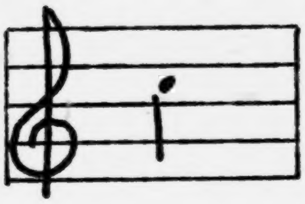


♩ - 76

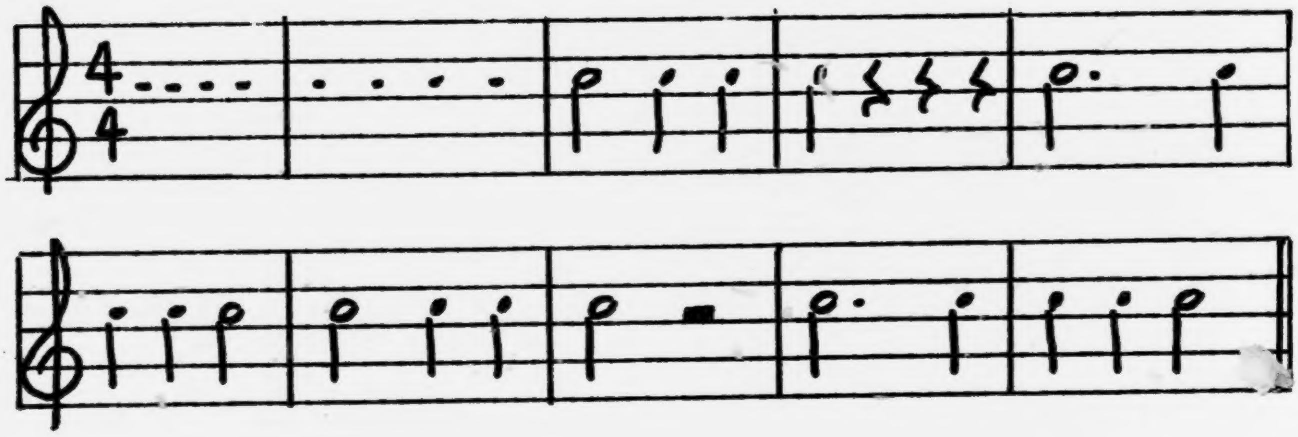


Item 110.

Play C

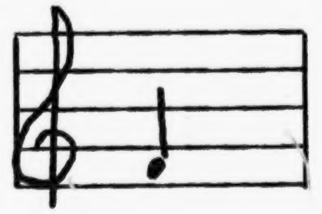


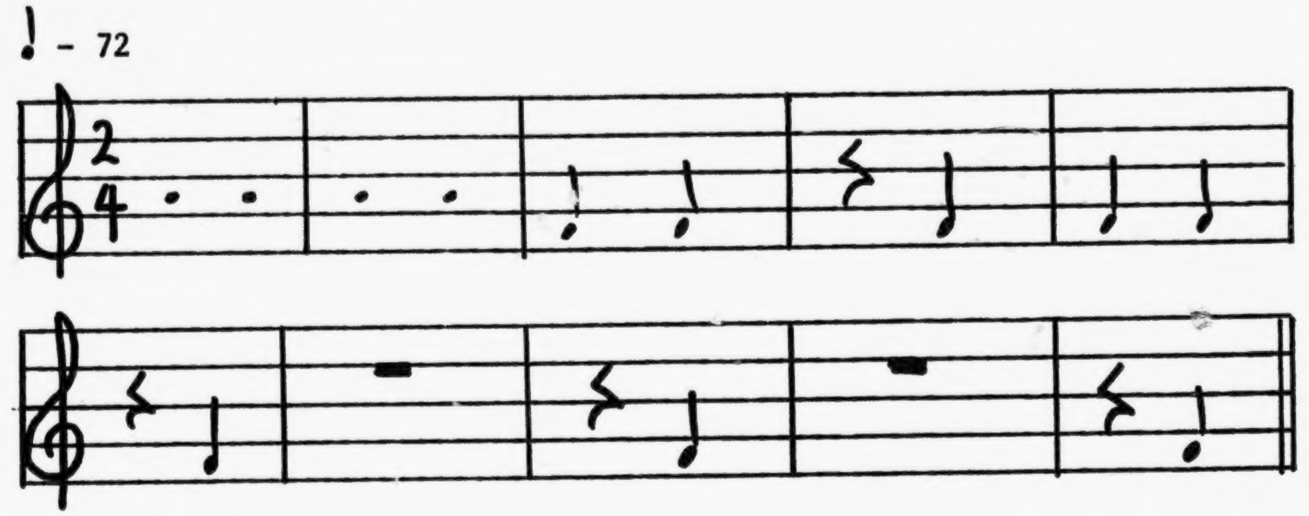
♩ - 96



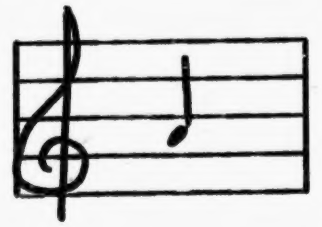
Item 111.

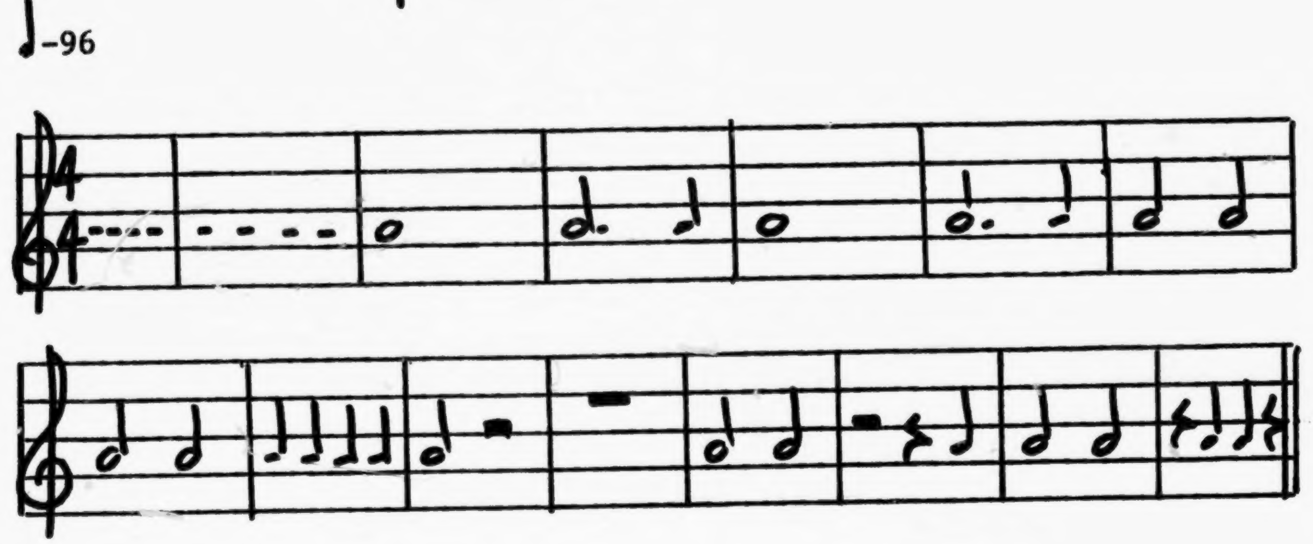
Play F





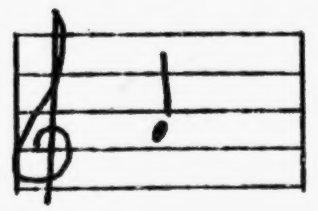
Item - 112. Play A

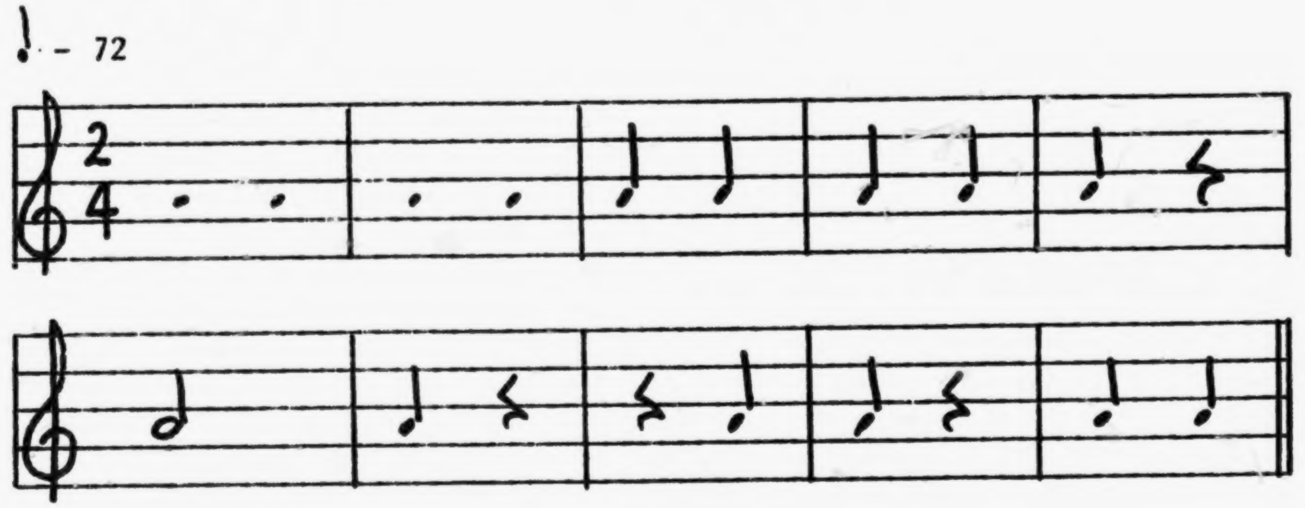




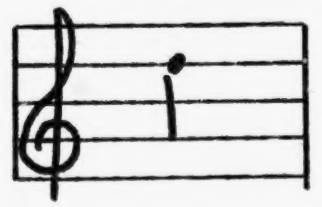
Item 113.

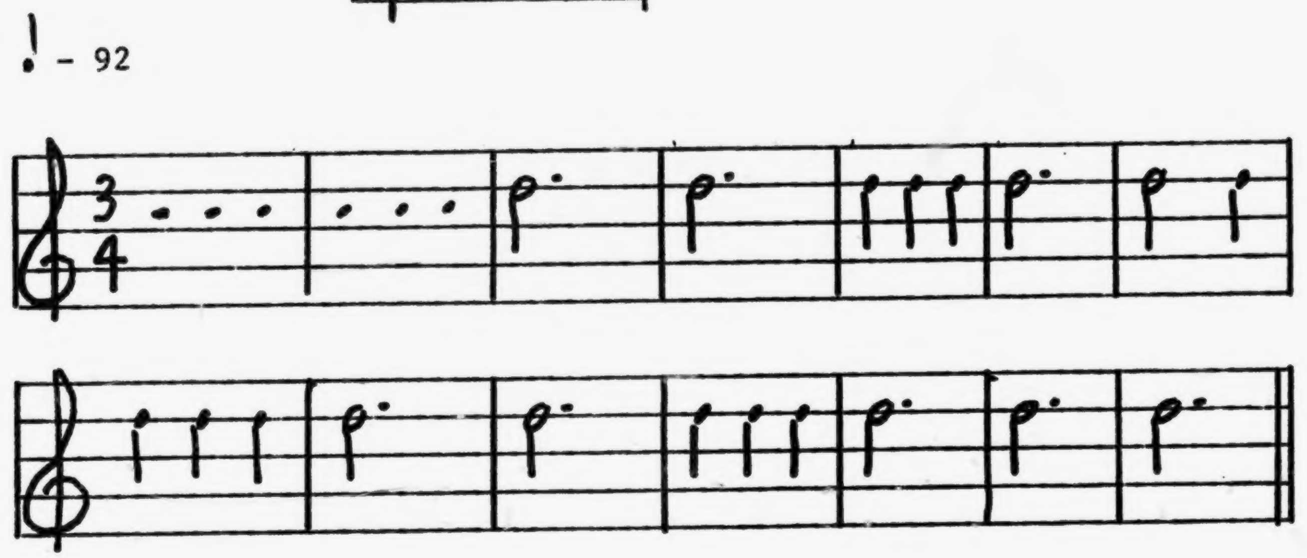
Play A





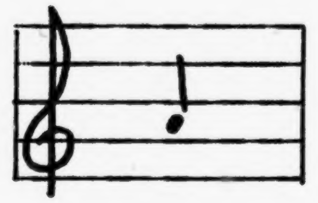
Item 114. Play D

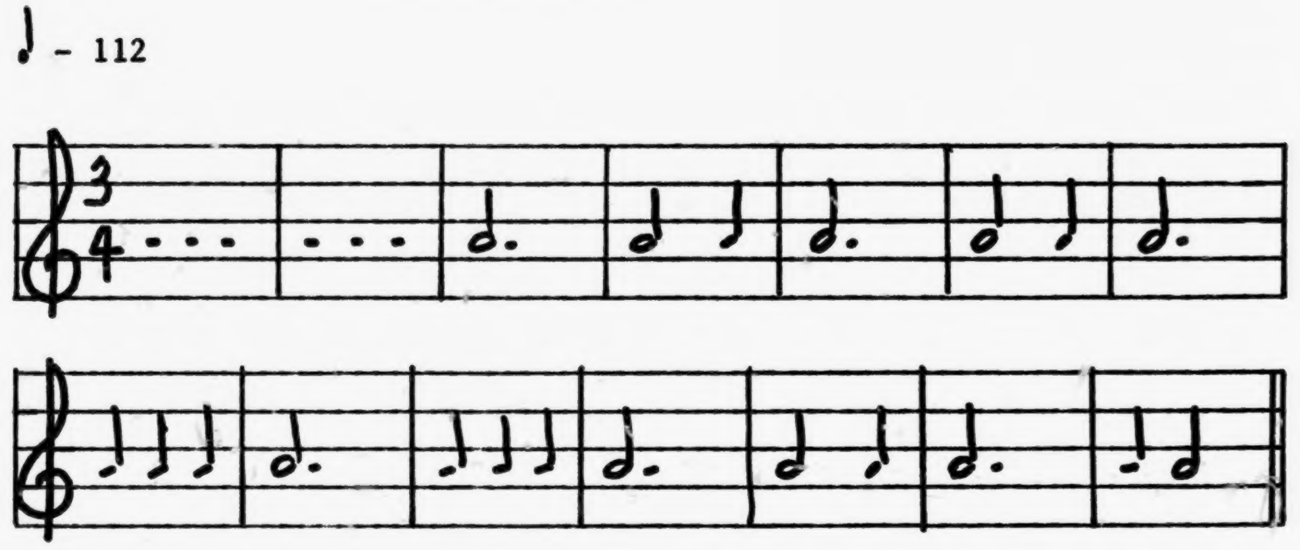




Item 115.

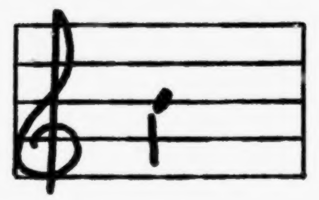
Play A

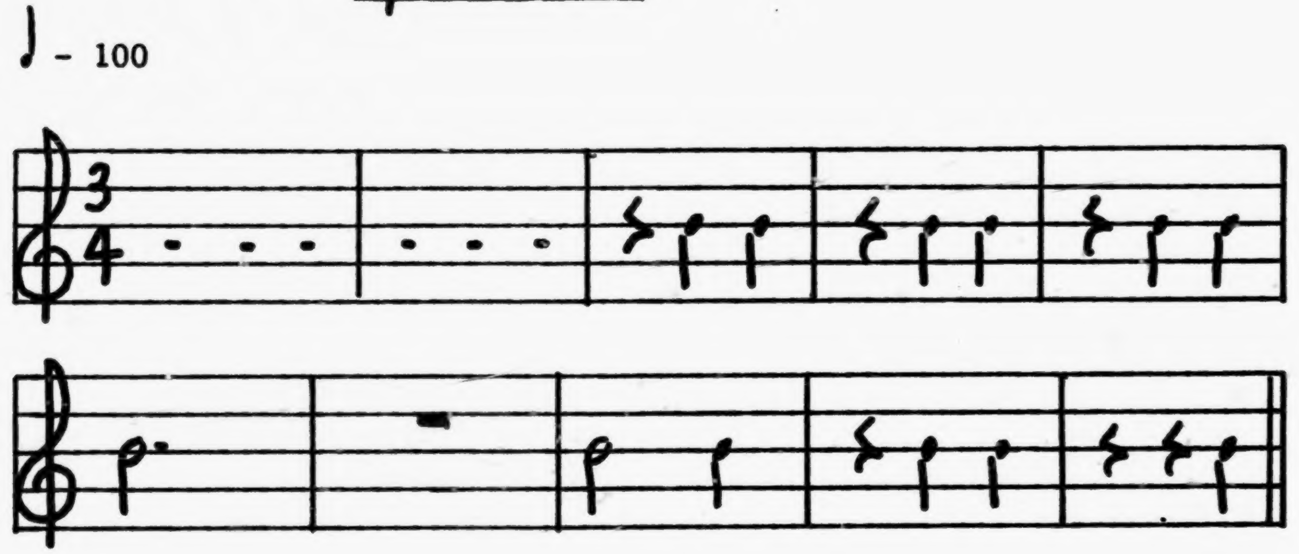




Item 116.

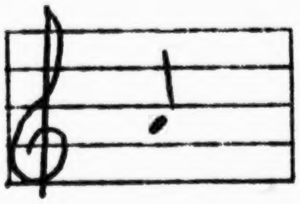
Play B



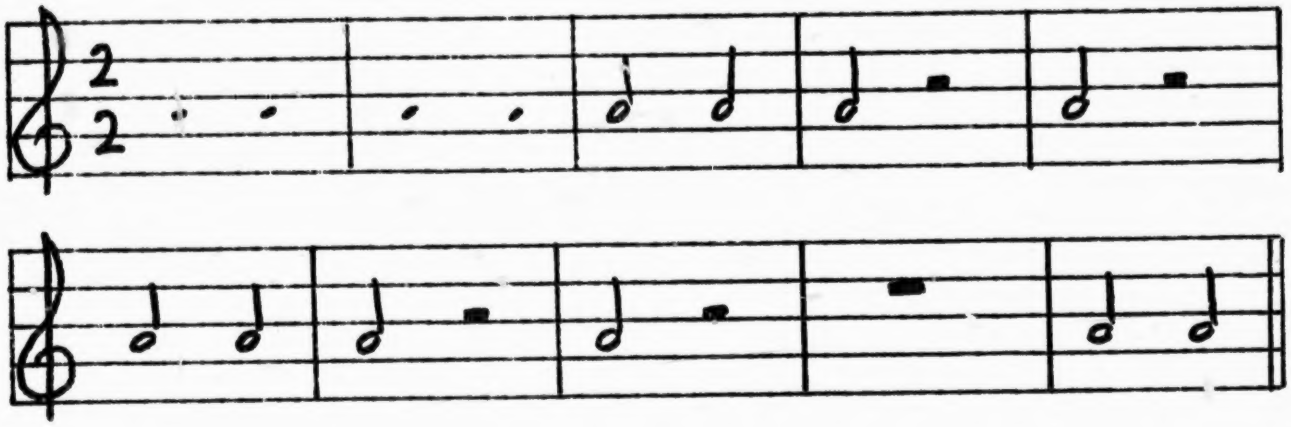


Item 117.

Play A

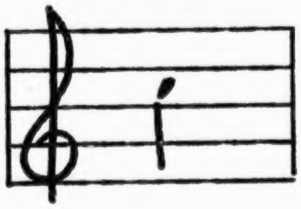


𝅗𝅥 - 88

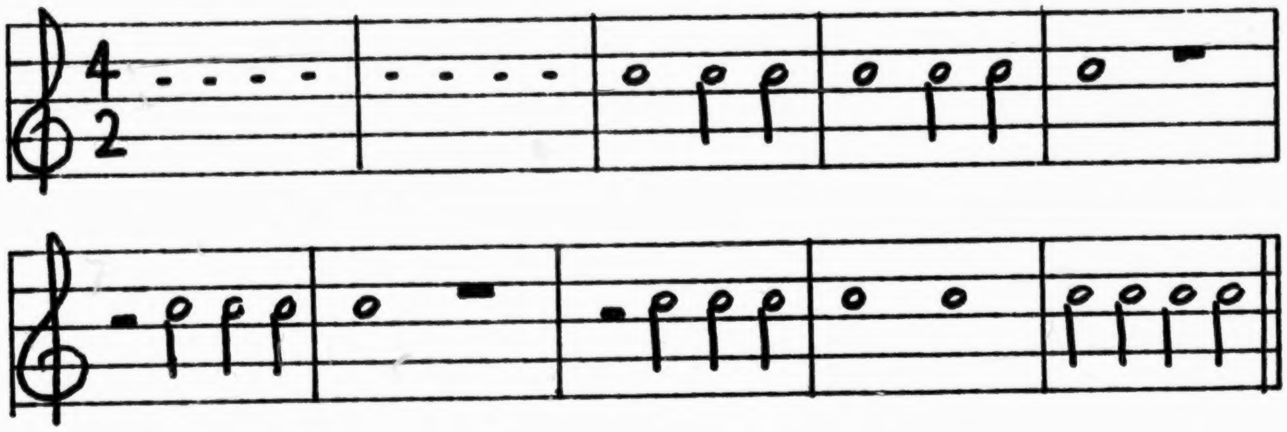


Item 118.

Play C

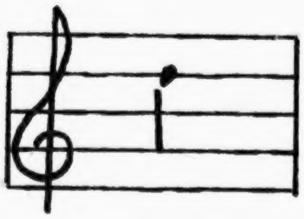


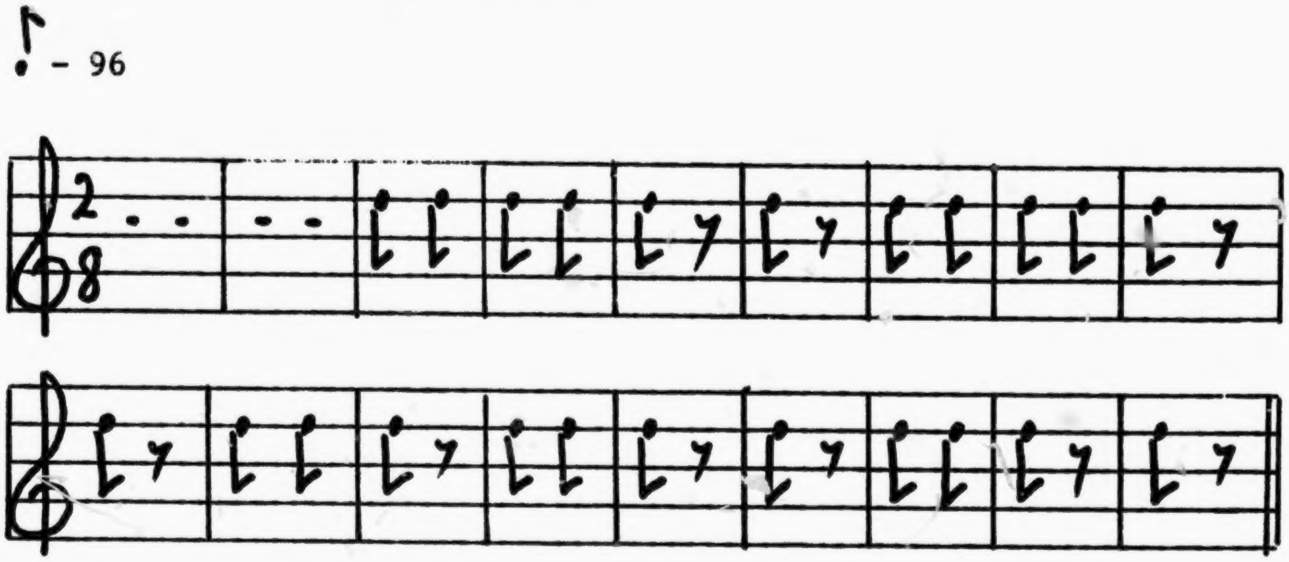
𝅗𝅥 - 112



Item 119.

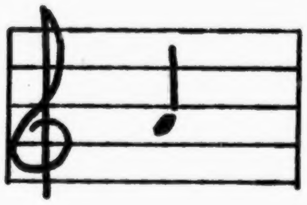
Play D

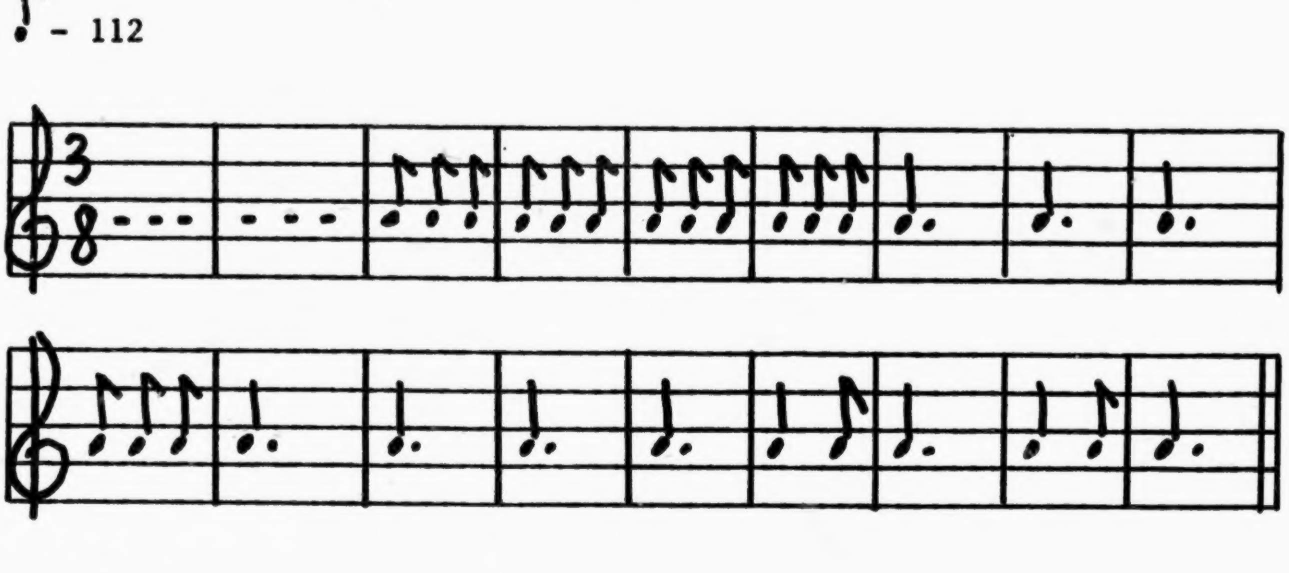




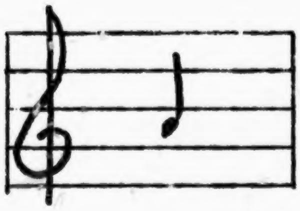
Item 120.

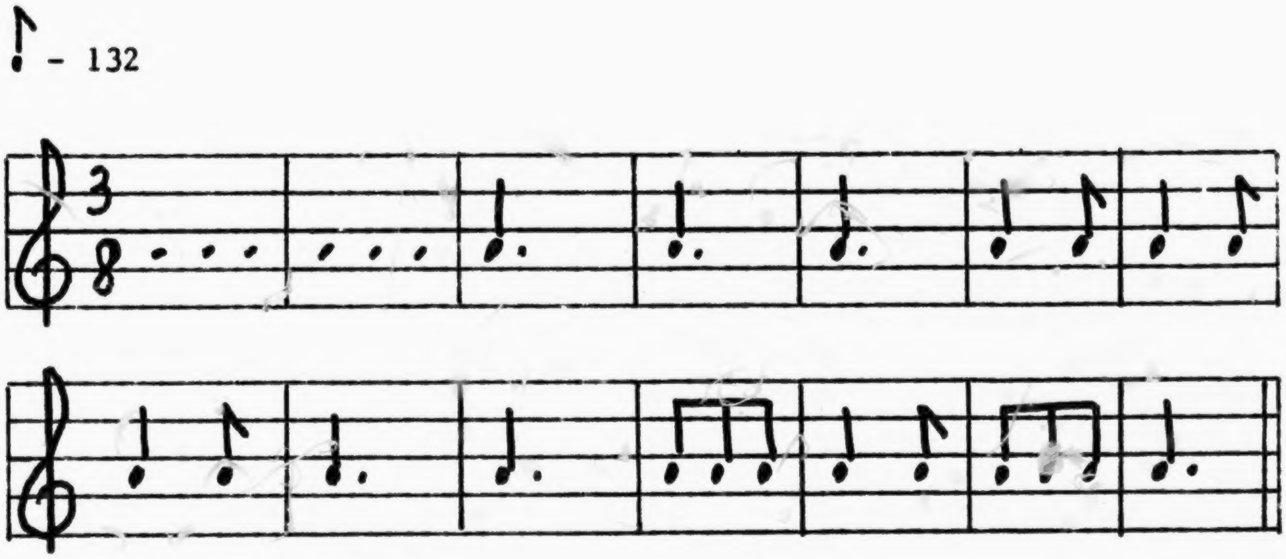
Play A



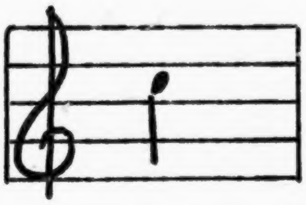


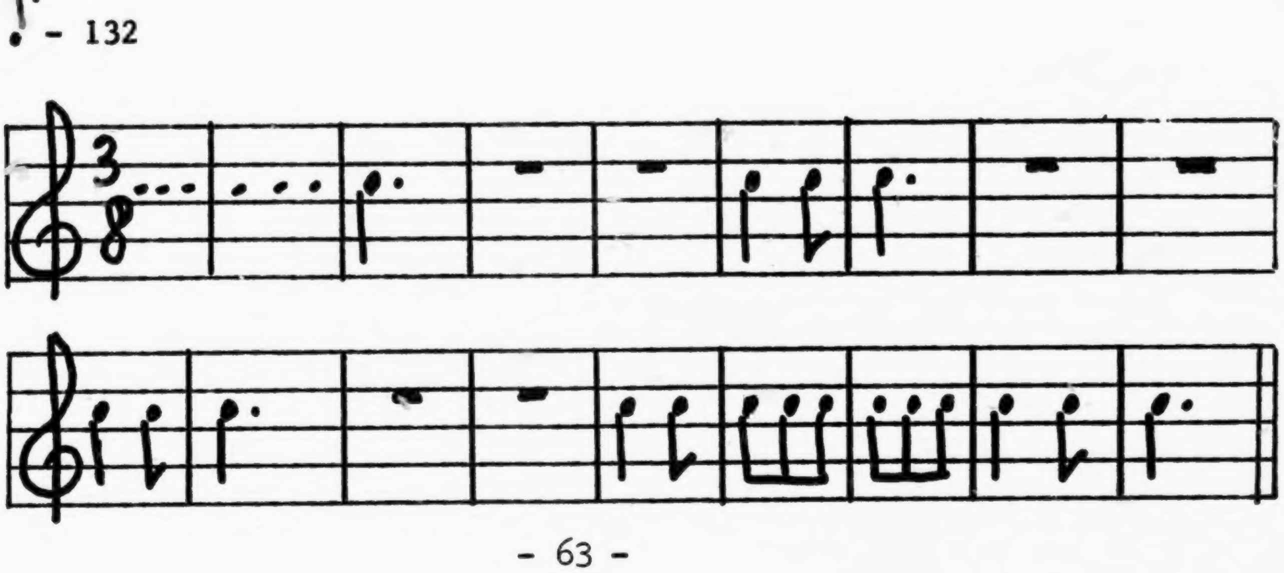
Item 121.

Play A 



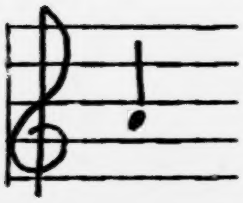
Item 122.

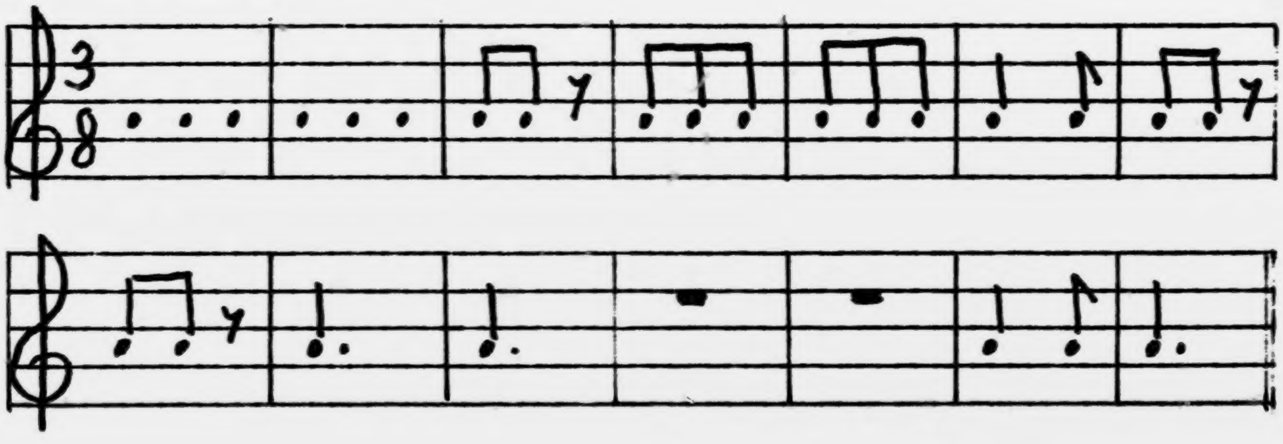
Play C 



Item 123.

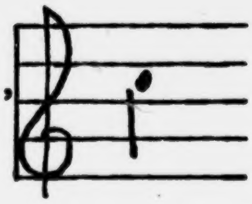
♪ - 132 Play A

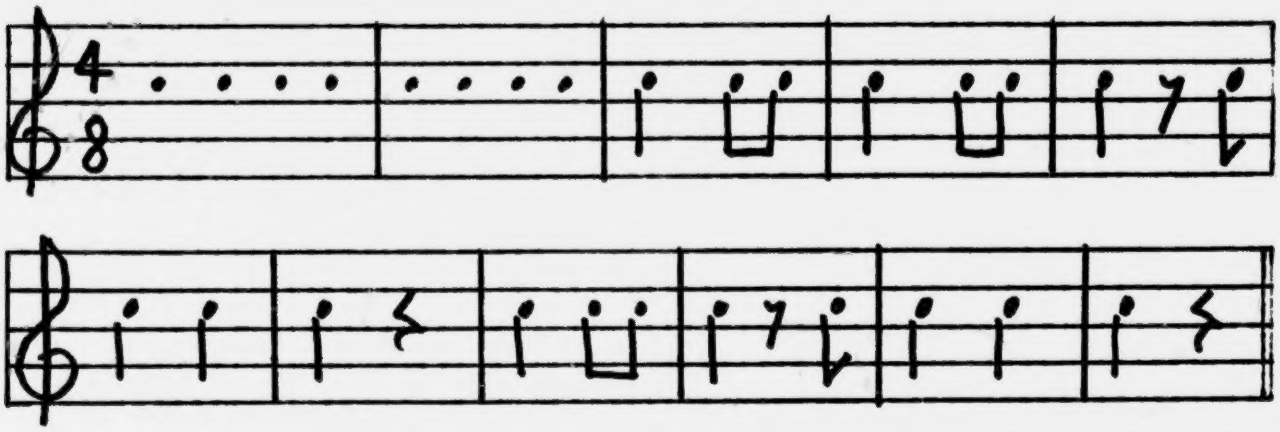




Item 124.

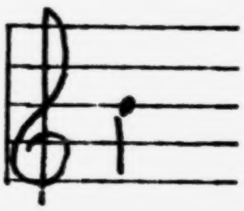
♪ - 112 Play C

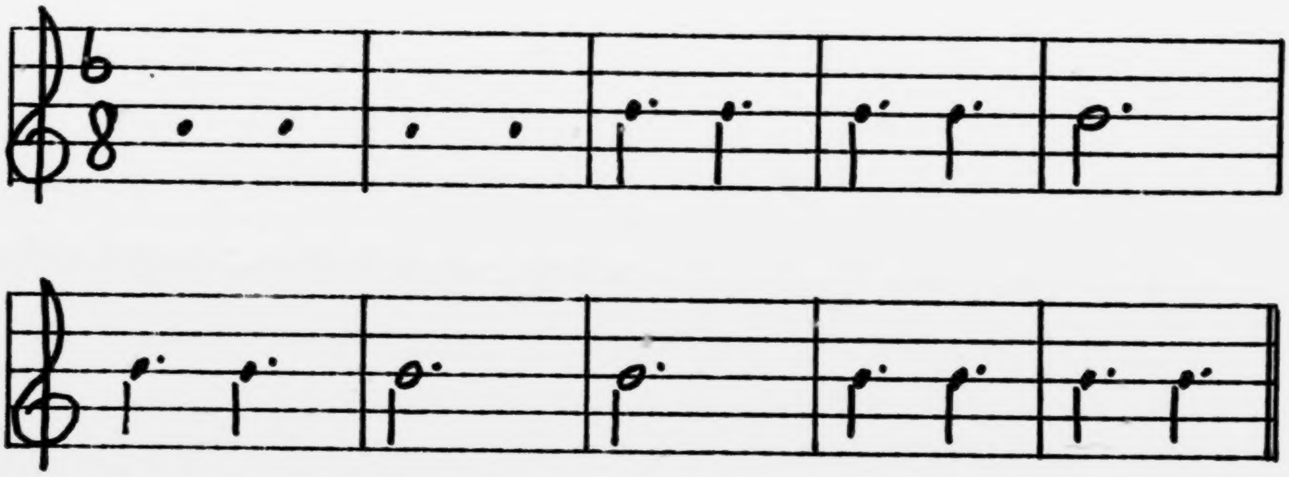




Item 125.

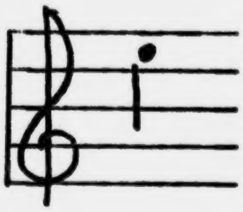
♩. - 100 Play B

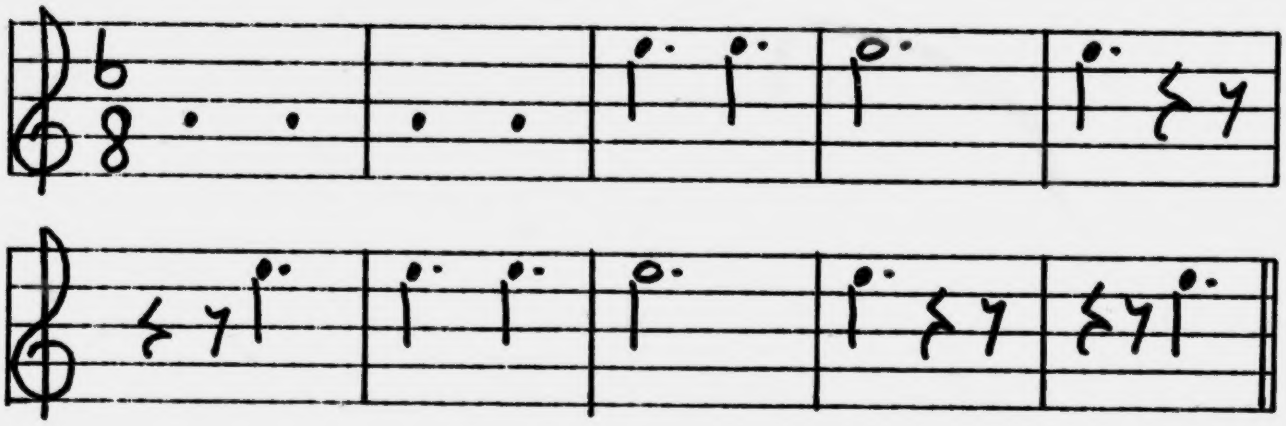




Item 126.

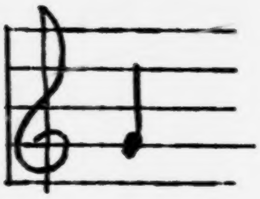
♩. - 72 Play E

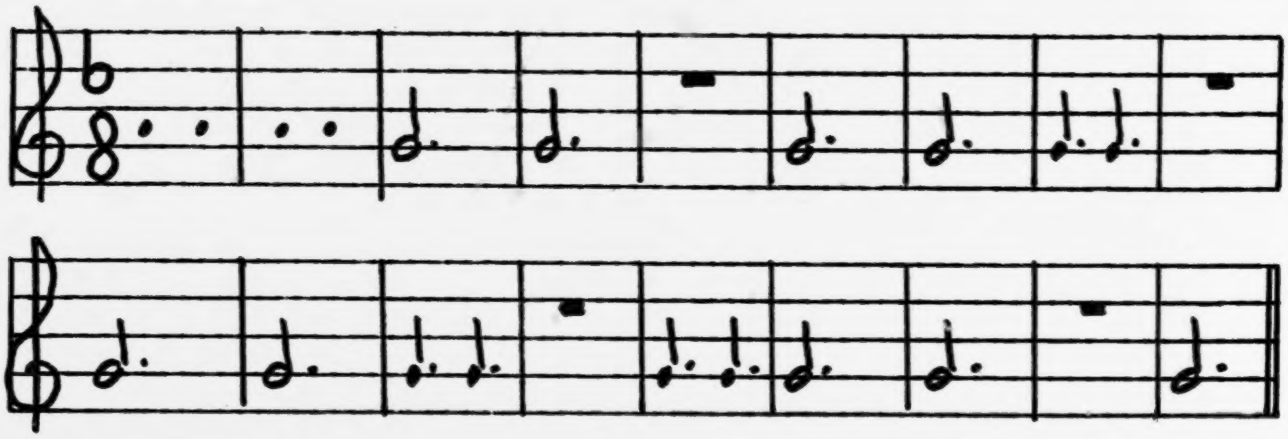




Item 127.

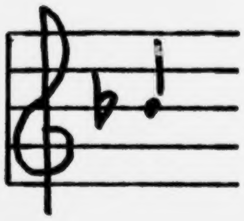
♩. - 84 Play G

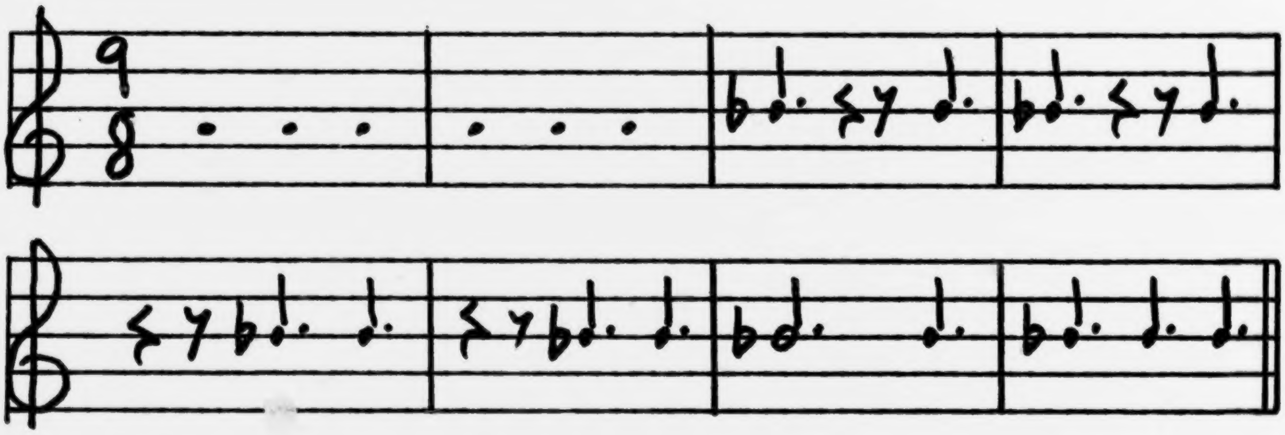




Item 128.

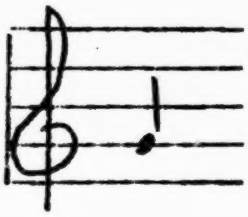
♩. - 66 Play B-flat

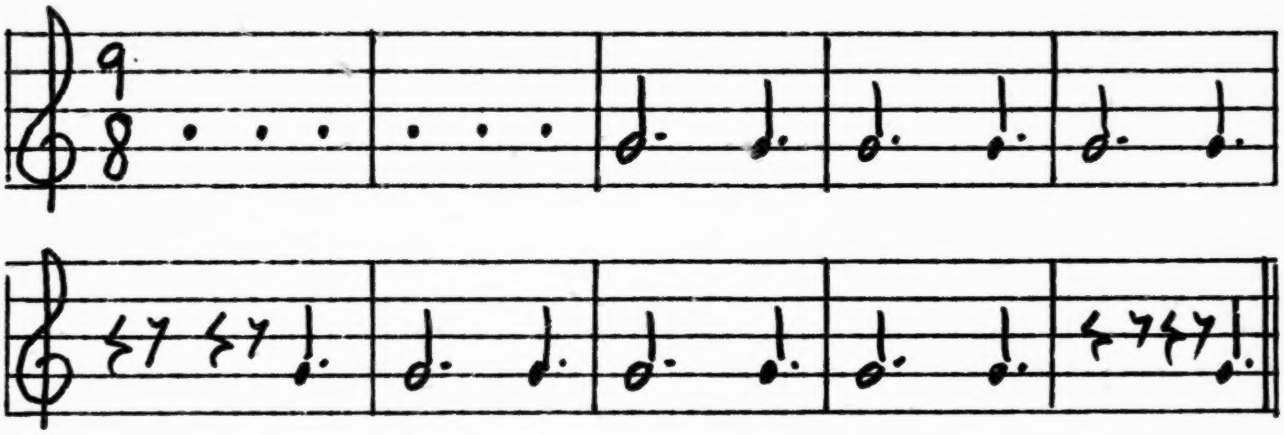




Item 129.

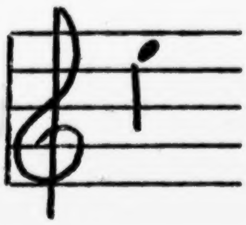
♩. - 84   Play G

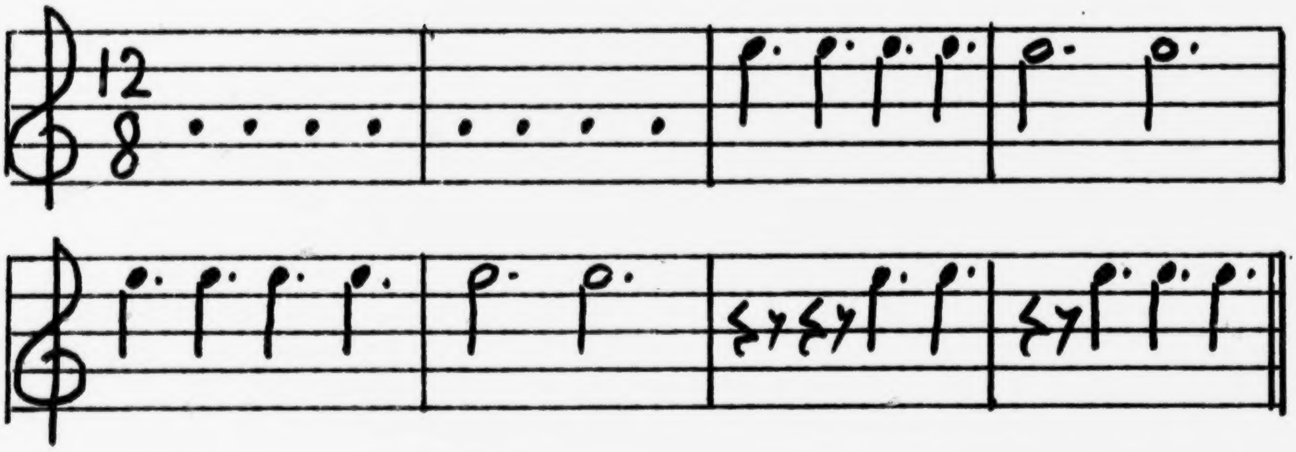




Item 130.

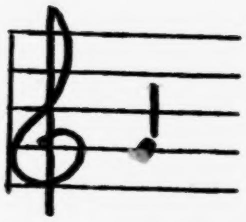
♩. - 72   Play E

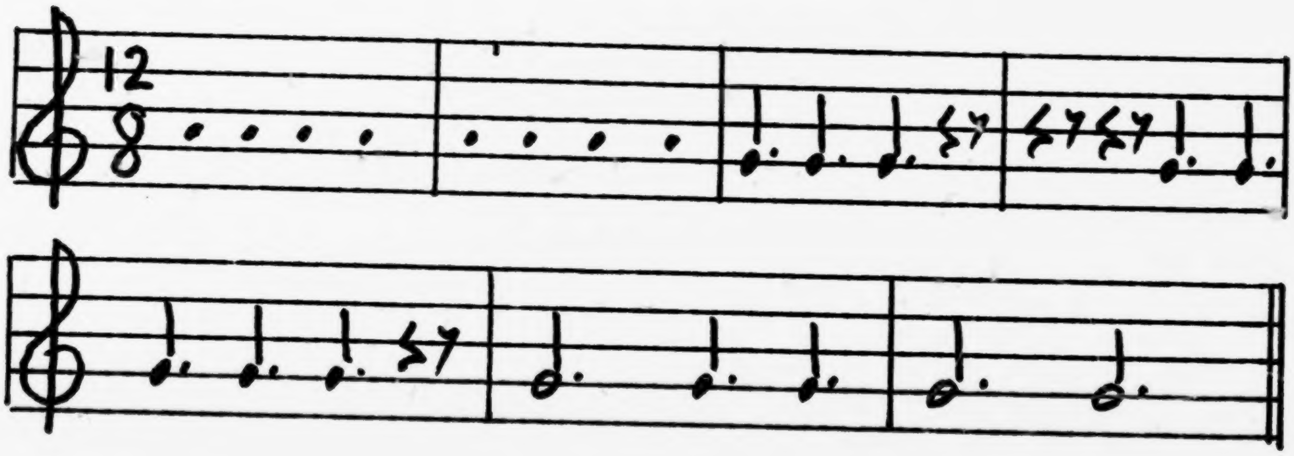




Item 131.

♩. - 80　　Play G





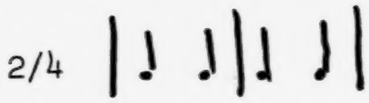
END OF REVIEW SECTION

SECTION II

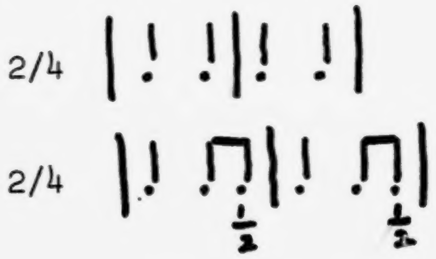
Divisions of the beat

Throughout section one you were required to tap on the beat, but not on every beat. Now your performance will include divisions of the beat.

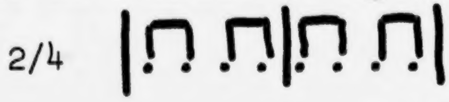
For example, if these two measures represent the beat pattern,



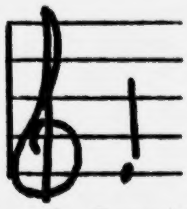
then the division of the beat will occur exactly halfway between one beat and the next,



which can result in a series of eighth-notes, like this:

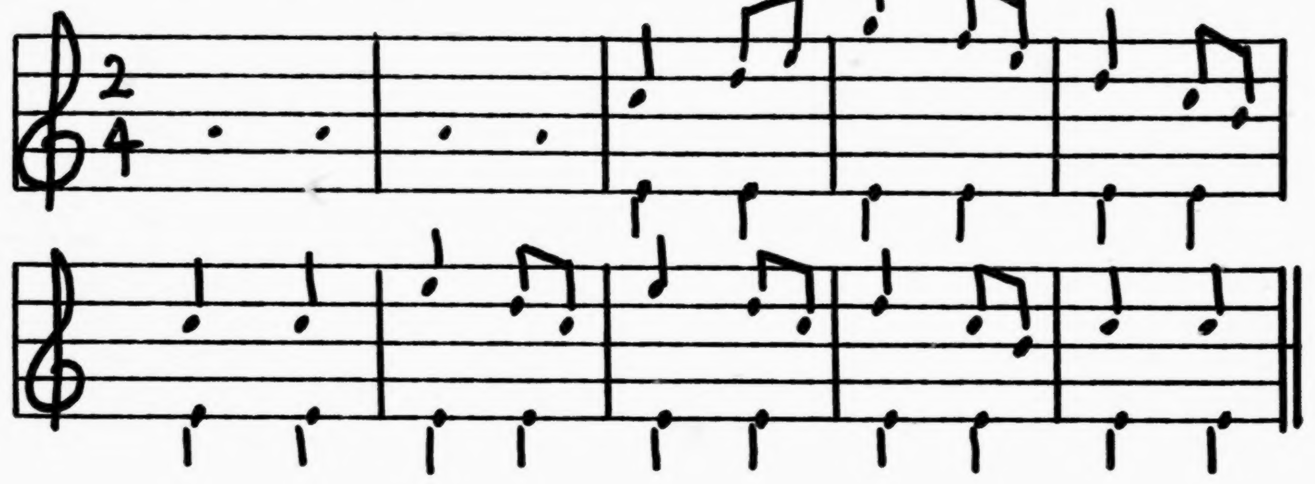


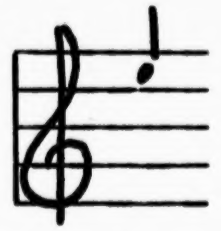
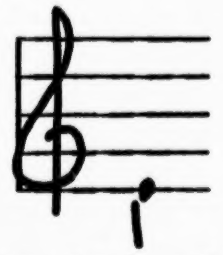
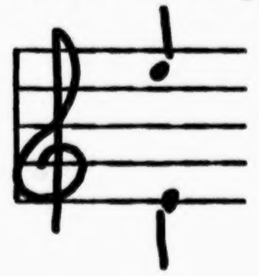
The following printed melody has been recorded with audible ticks in the background. The first time through, follow the melody and compare the rhythm to that of the steady quarter-notes printed on the "E" line:



The lights will not function until Item 132.

Example 1. ♩ - 100



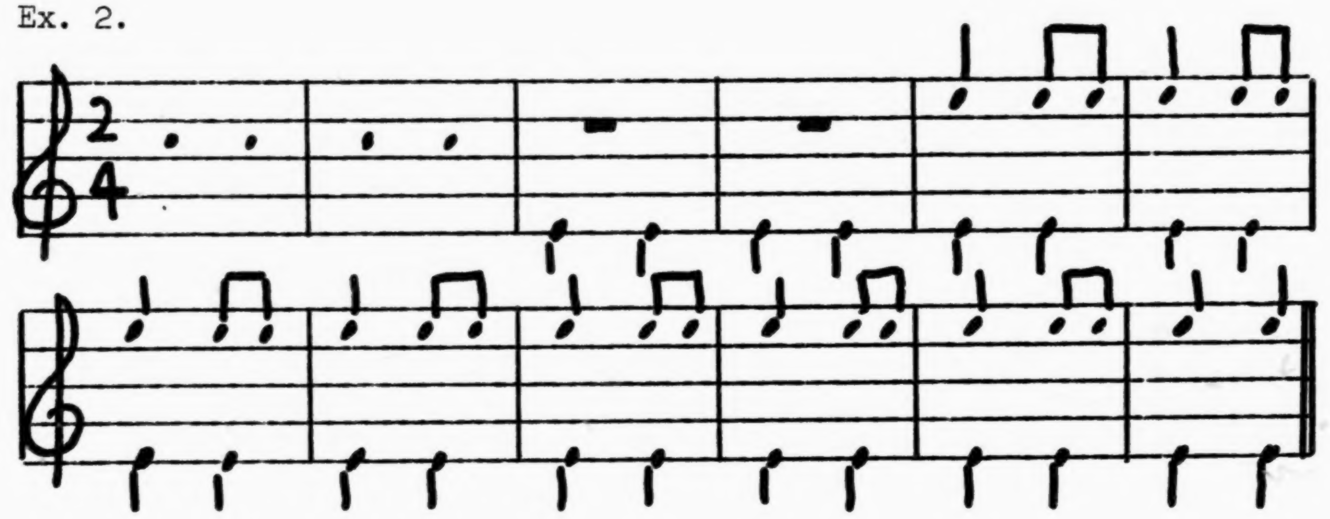
In the next few practice examples you will need to play this upper "E"  with your right hand and this lower "E"  with your left hand. The notation for the notes to be played at the same time will appear like this: 

To repeat any of these examples, merely press the rewind button.

The audible ticks will keep time throughout these examples.

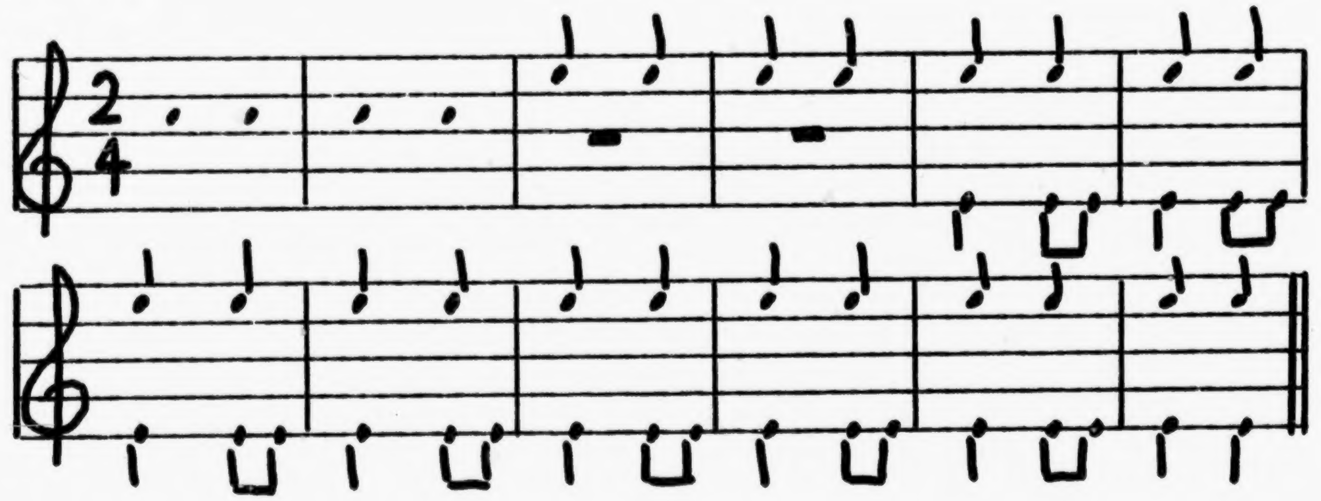
You are now ready to begin. The left hand starts directly after the two-measure introduction, and the right hand two measures later. Also notice that the two whole-rests prepare the late entrance of the right hand.

Ex. 2.



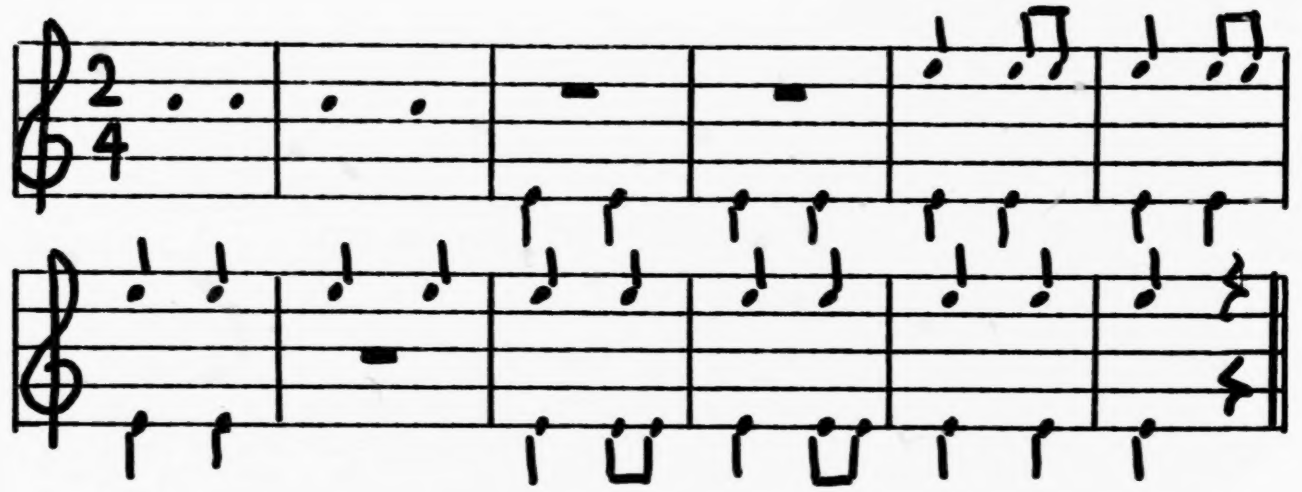
Now the right hand starts directly after the two-measure introduction, and the left hand enters two measures later.

Ex. 3.

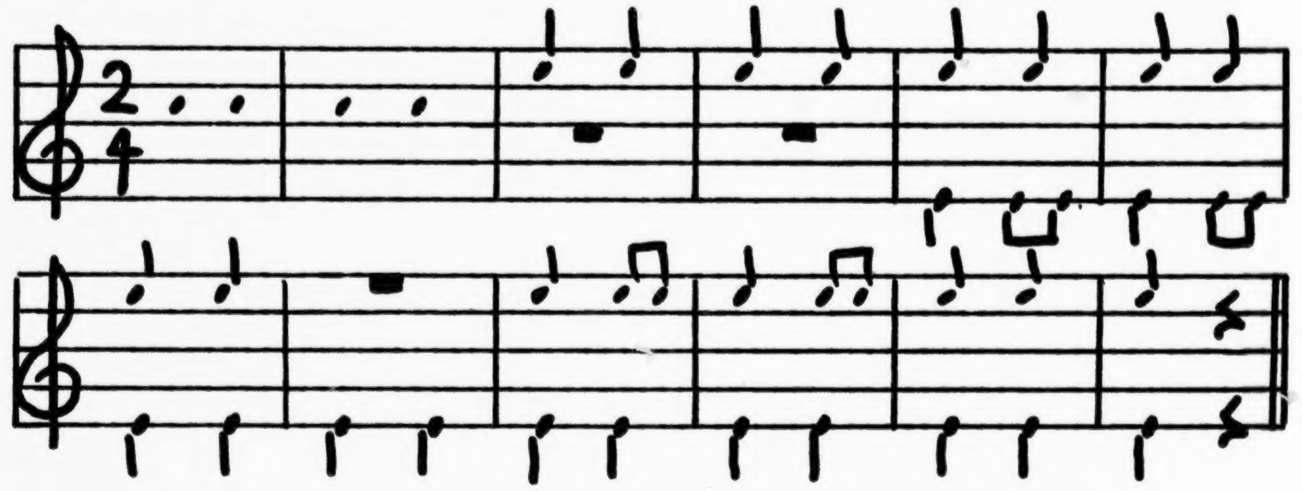


This time the pattern is changed slightly. Ticks will continue to sound.

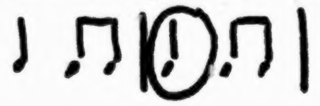
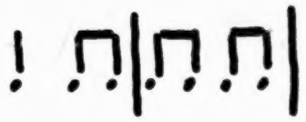
Ex. 4.



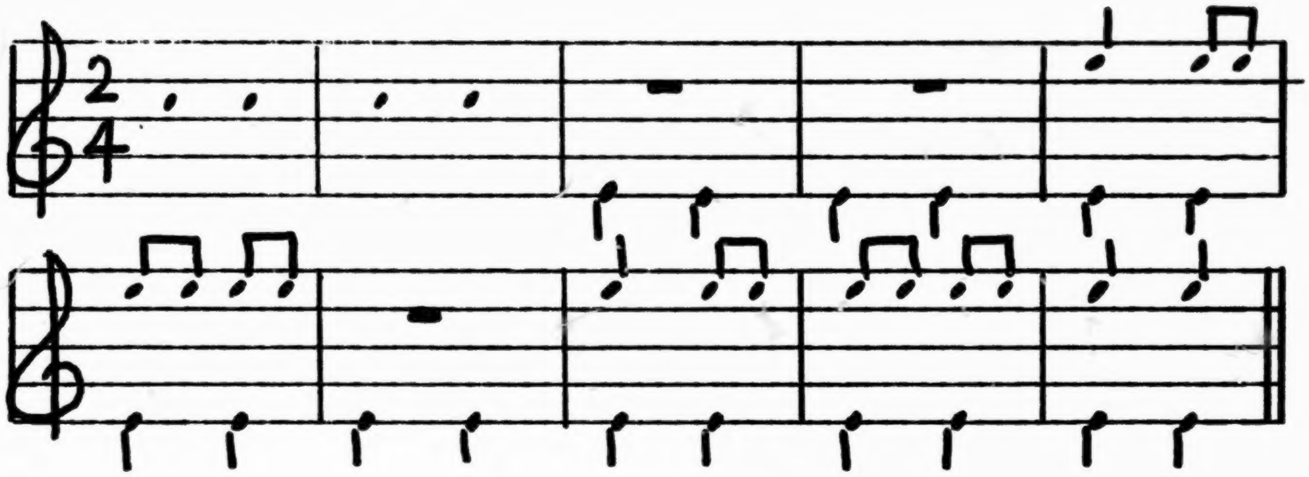
Ex. 5.

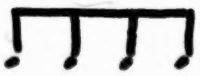


Now divide the circled quarter-note

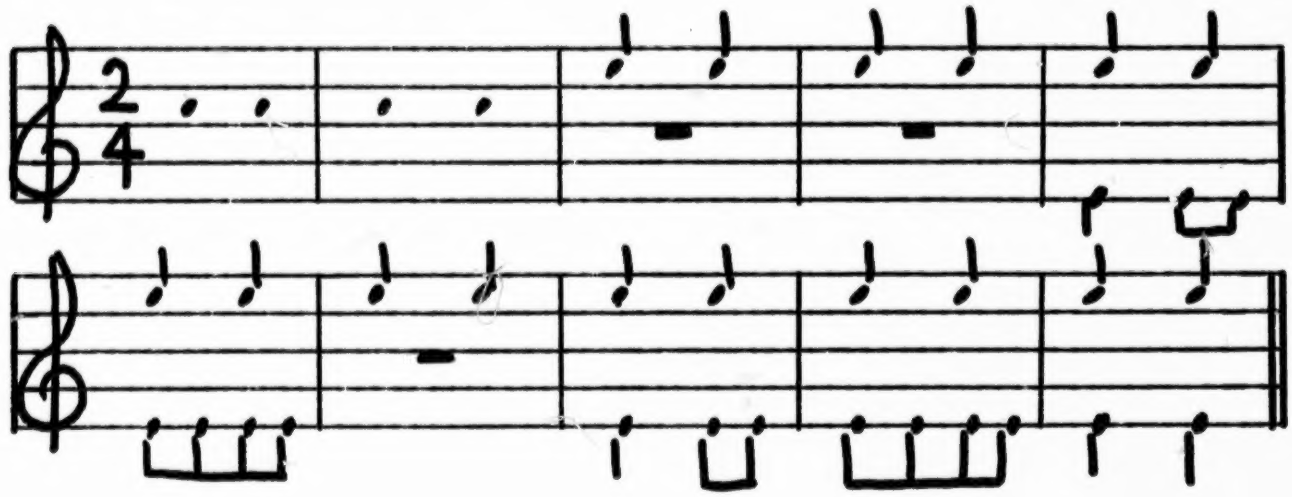
in the pattern  to get 

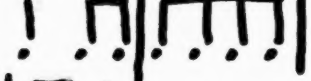
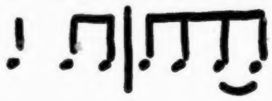
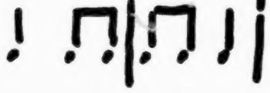
Ex. 6.



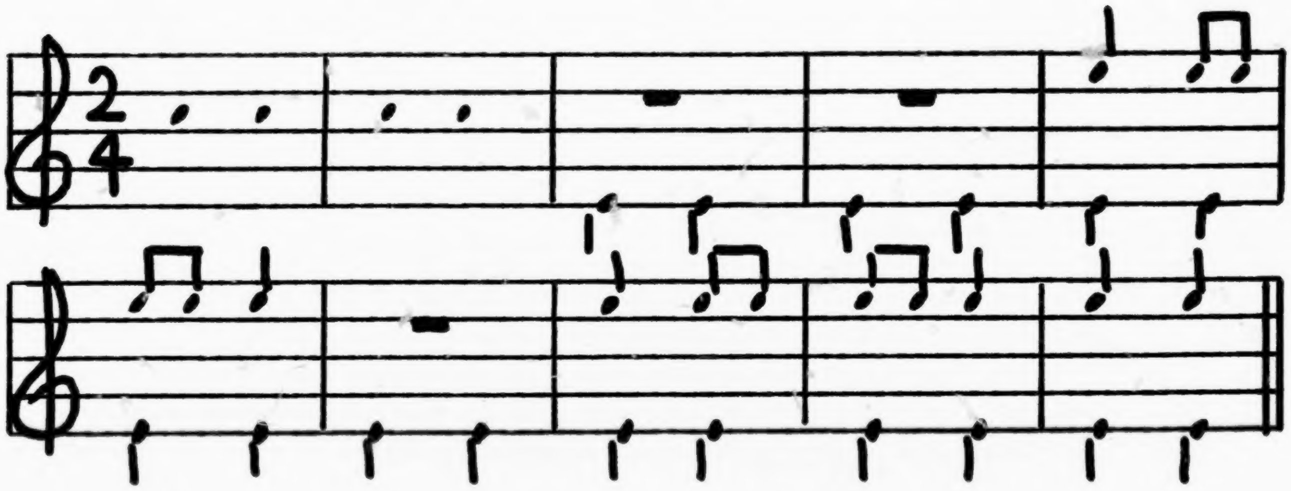
The four eighth-notes can be written like this: 

Ex. 7.

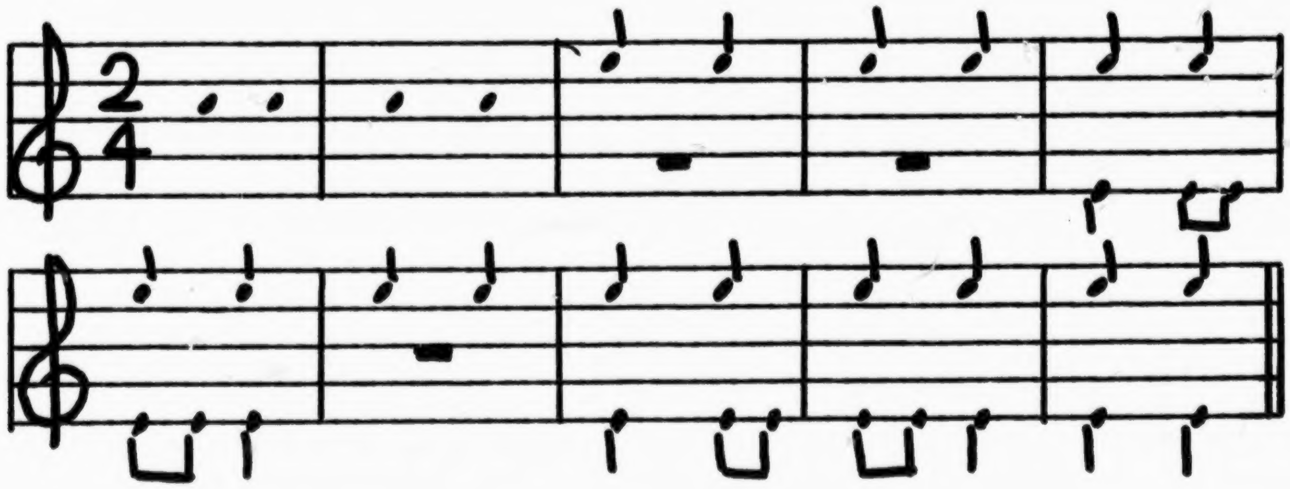


Now tie the last two eighth-notes in 
to get  or 

Ex. 8.

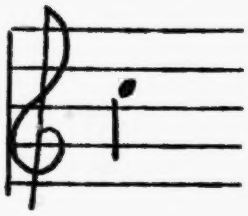


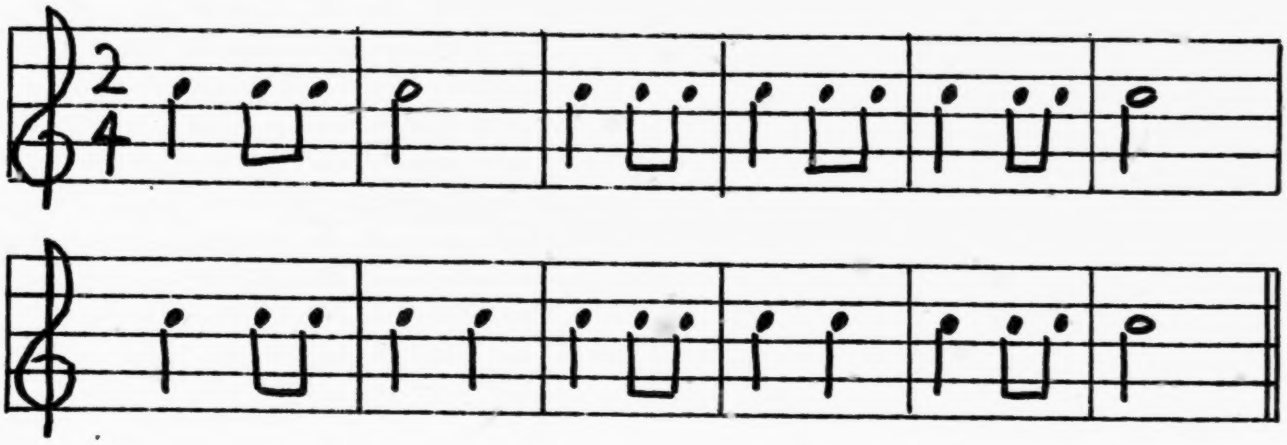
Ex. 9.



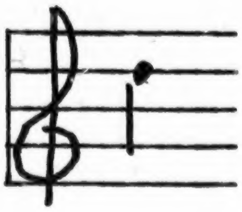
You are now ready to begin Item 132. Turn lights on.

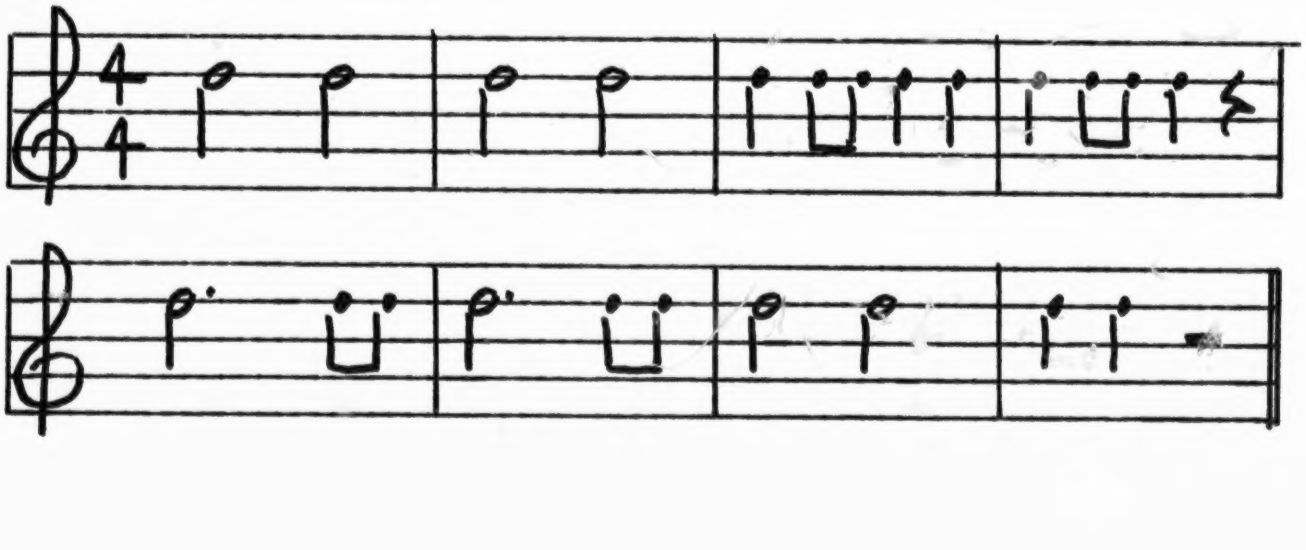
Item 132. ♩ - 96 Play C.





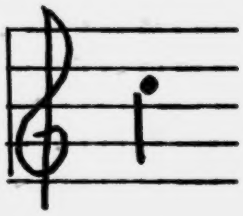
Item 133. ♩ - 112 Play D.

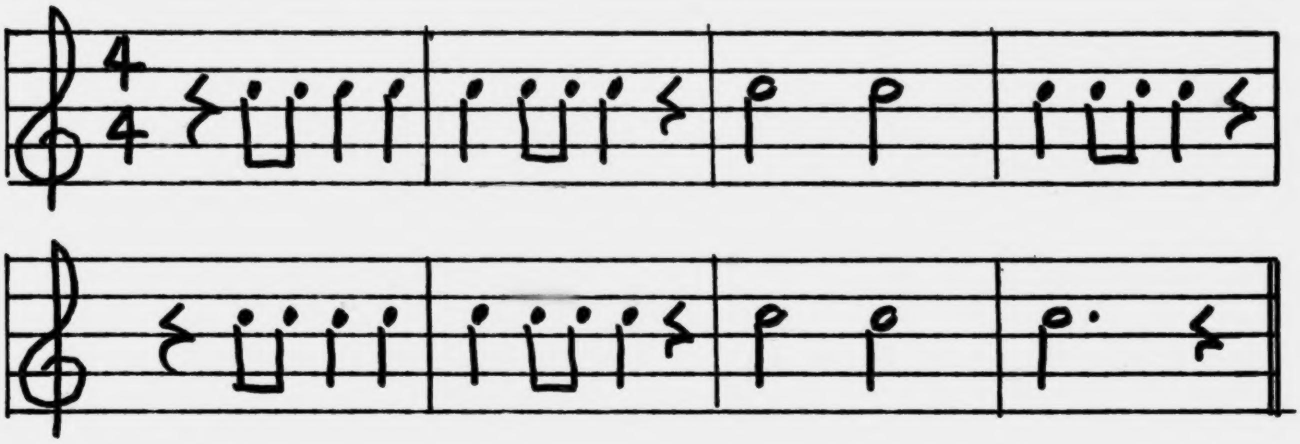




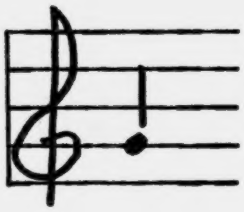
Item 134. In this item, the quarter-note in the pattern ♩ ♫ has been replaced by a quarter-rest, forming this four-beat pattern: 𝄽 ♫ ♩ ♩

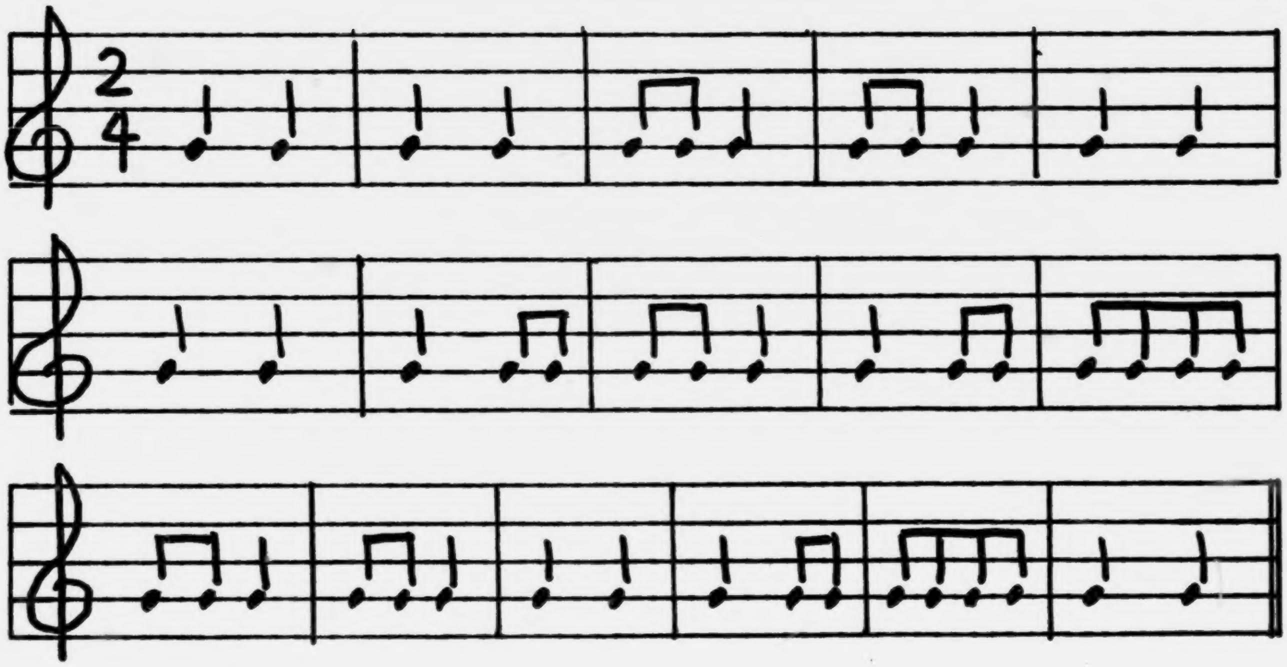
♩ - 112 Play C.



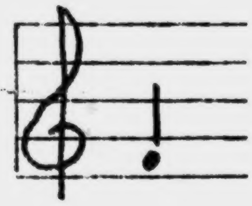


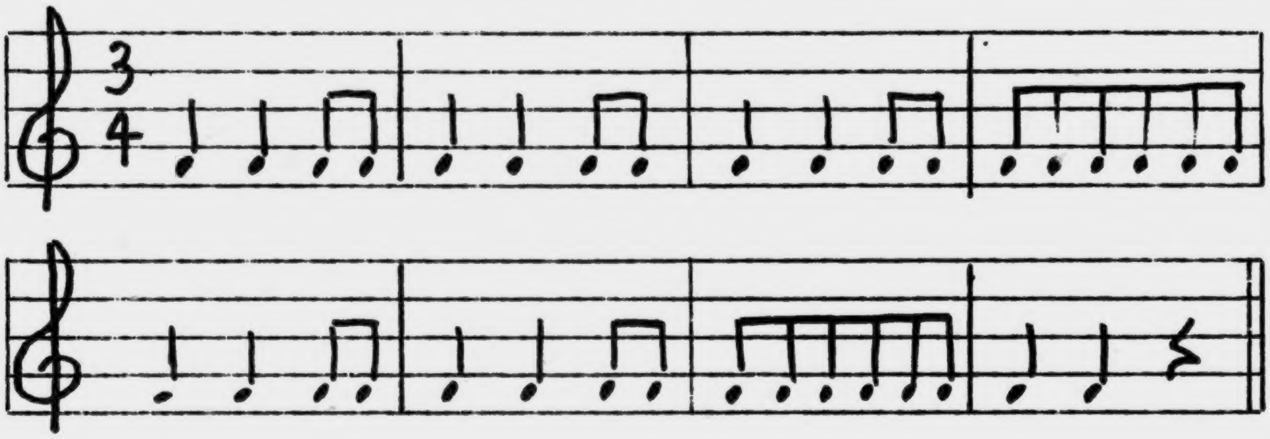
Item 135. ♩ - 108 Play G.



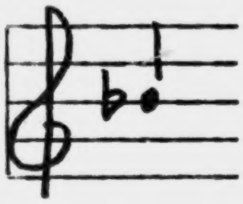


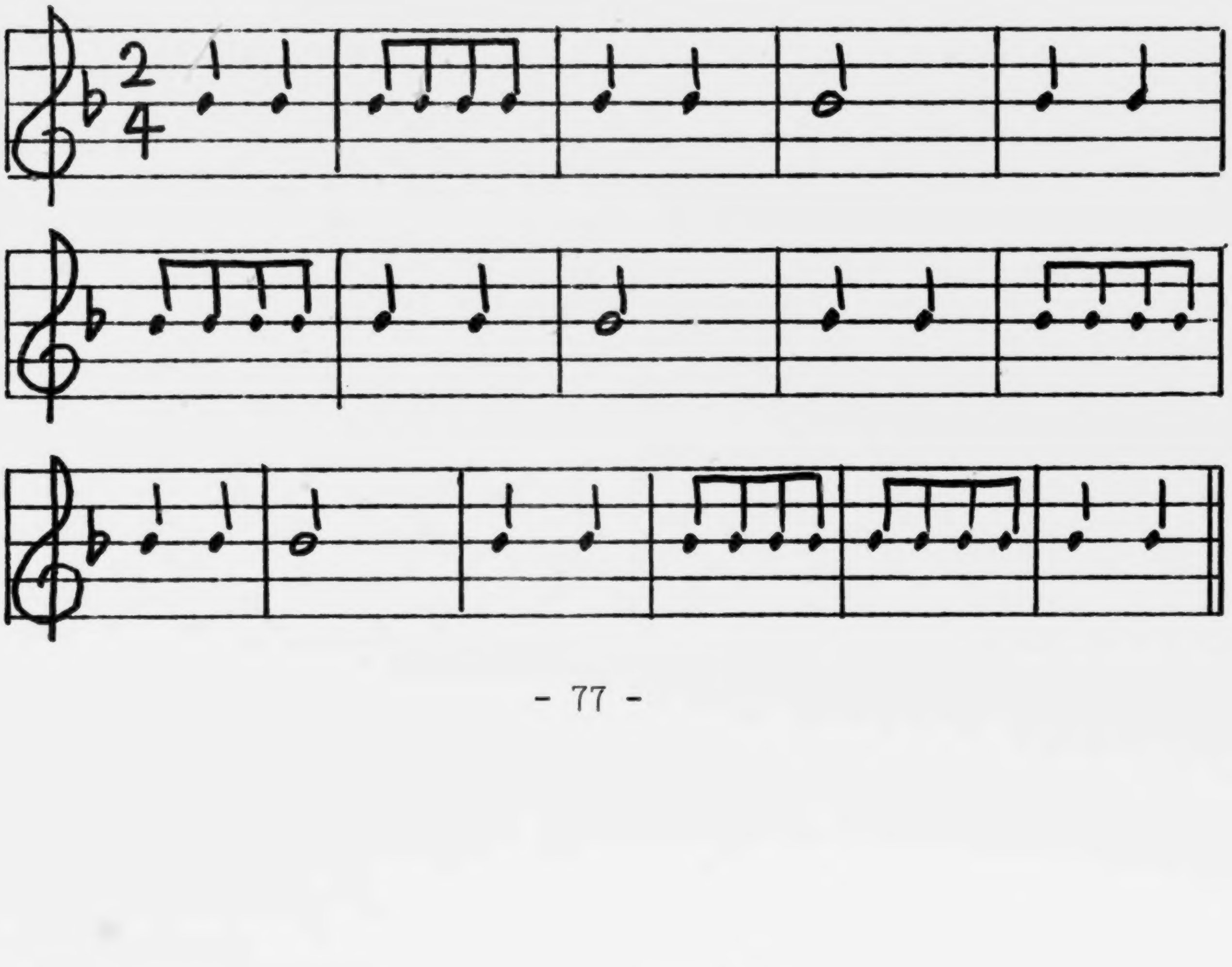
Item 136. ♩ - 116 Play F



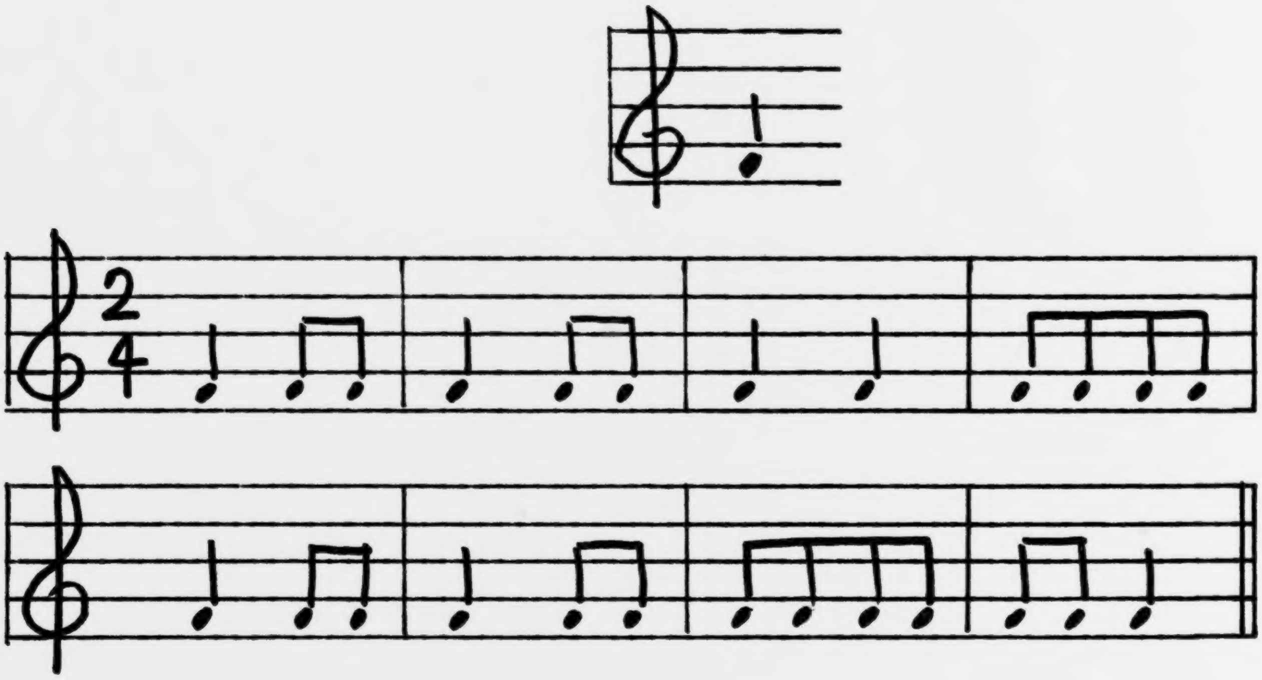


Item 137. ♩- 116 Play B-flat

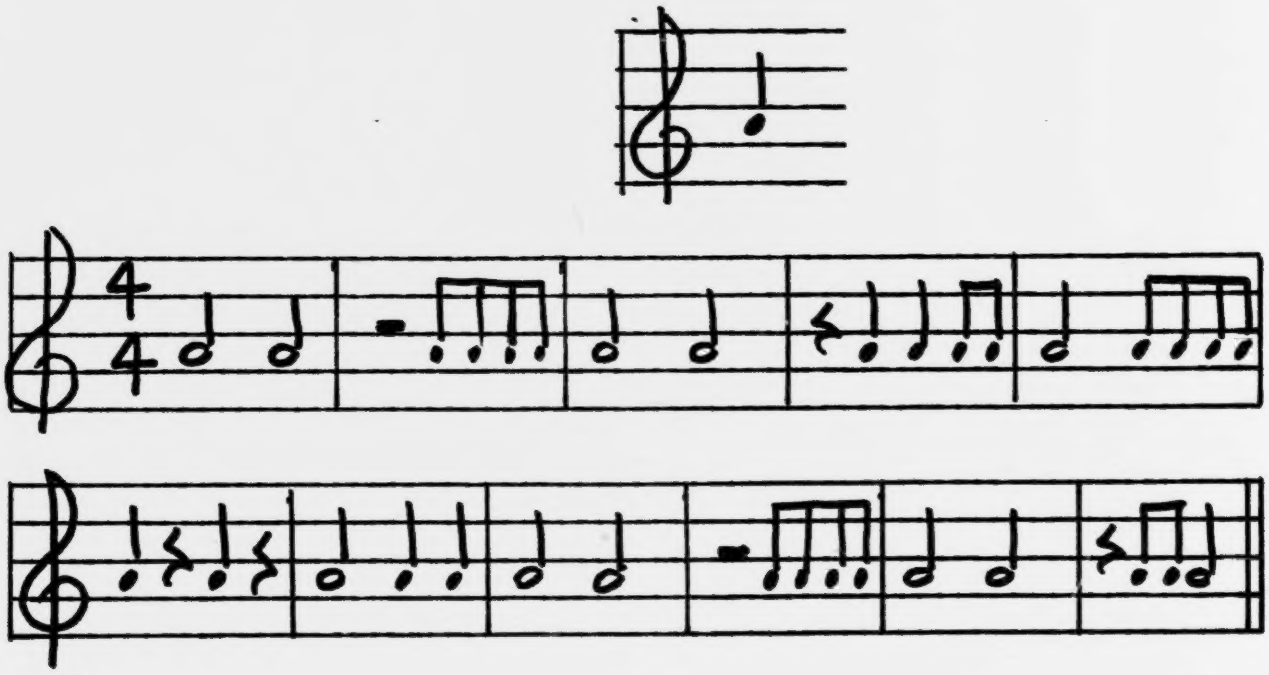




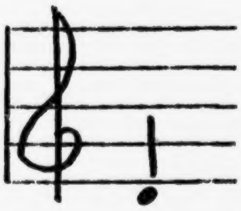
Item 138. ♩ - 72 Play F.

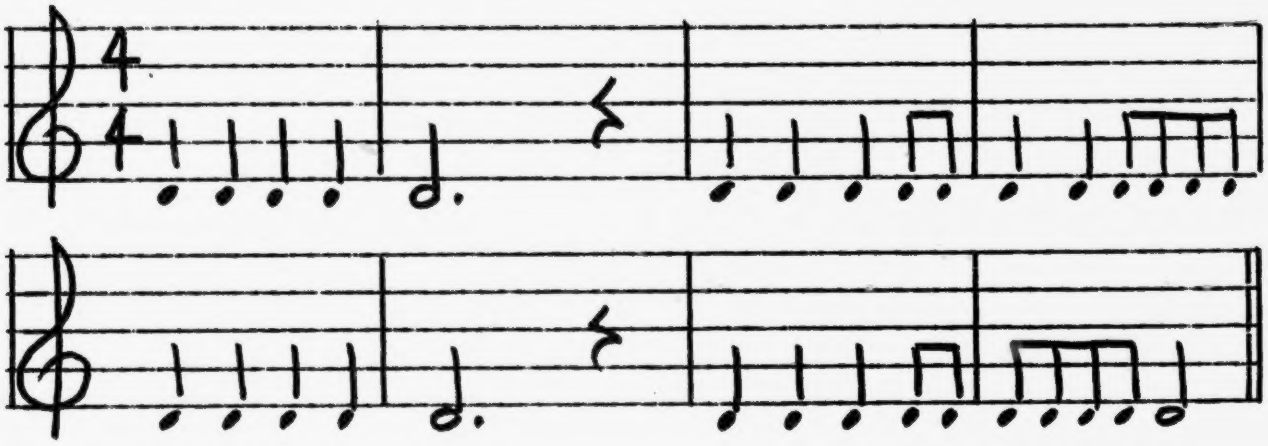


Item 139. ♩ - 112 Play A.



Item 140. ♩ - 116 Play D.





A dot after a rhythmic unit adds an extra 1/2-value to the duration of that unit. For example:

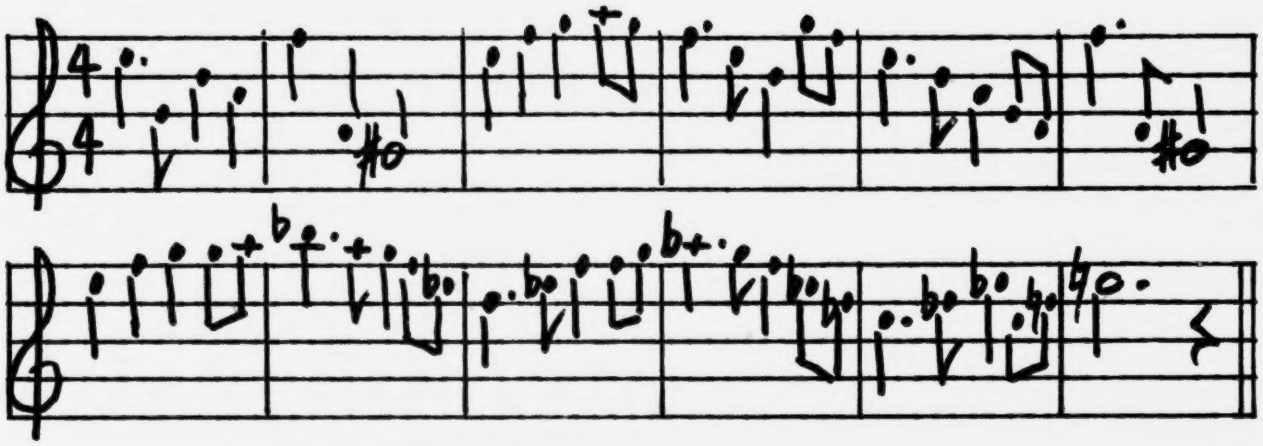
♩. = ♩‿♪
unit + dot unit + 1/2-value

In 4/4 time, if we wish to lengthen the duration of a quarter-note by adding an eighth-note, we would have:

Ex. 10 4/4 ♩‿♫ ♩ ♩ or, with the dot, 4/4 ♩. ♪ ♩ ♩

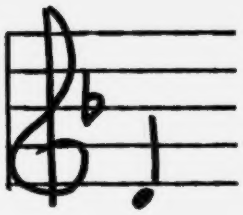
The following melody has been recorded with audible ticks in the background. Follow the melody and compare it to the four audible ticks in each measure. Lights are off.

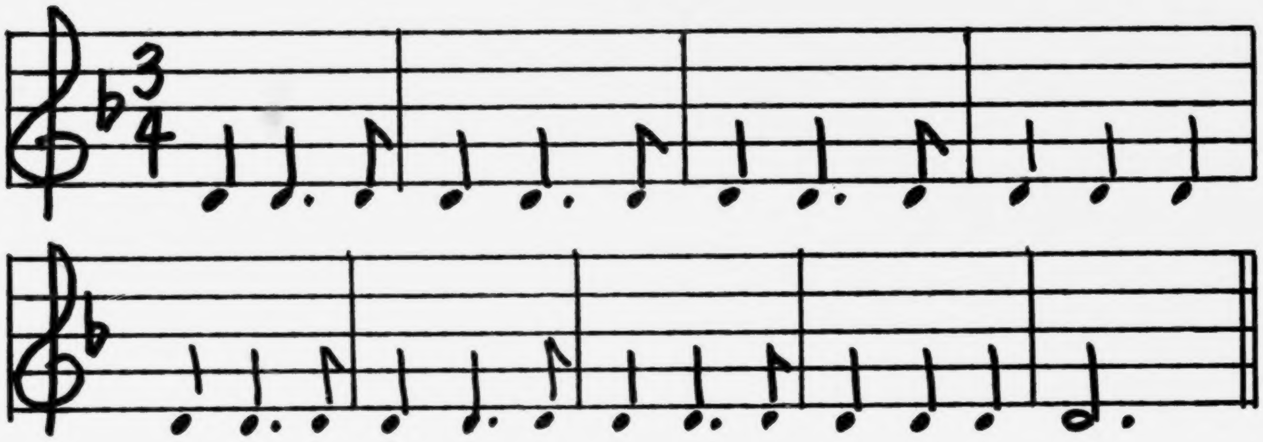
♩ - 92



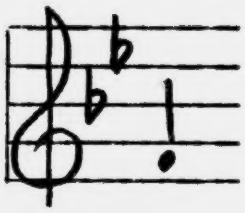
Turn on lights, and proceed to next item.

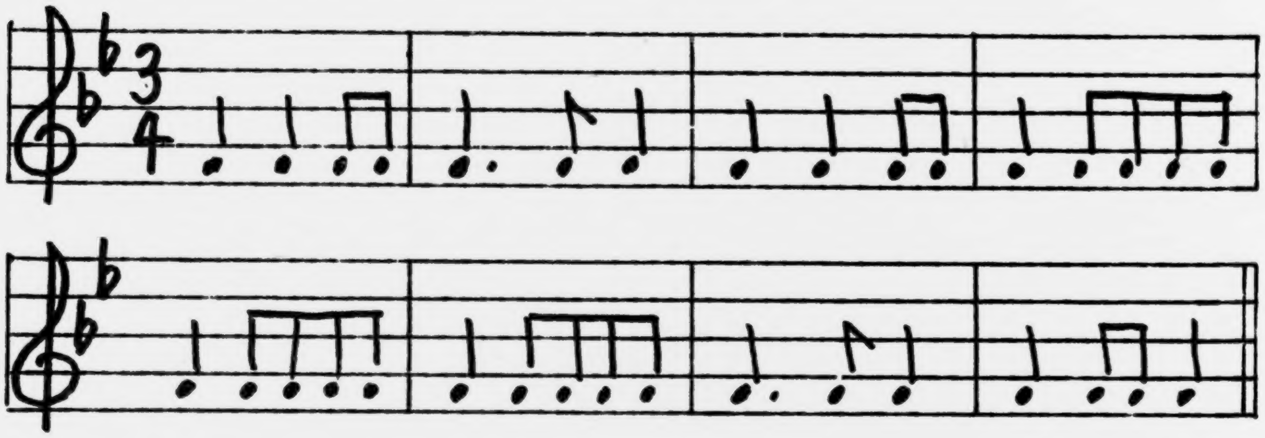
Item 141. ♩ - 60 Play D



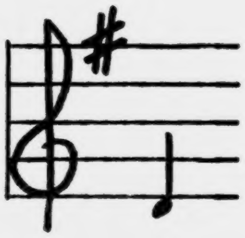


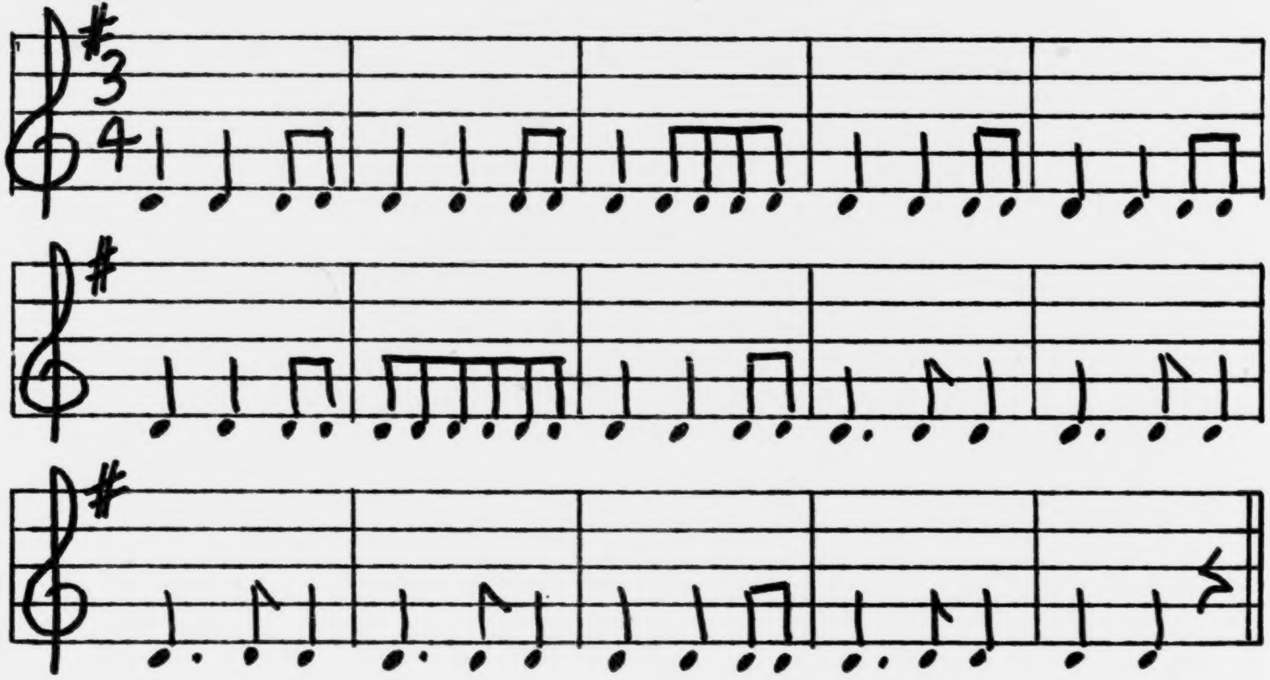
Item 142. ♩ - 80 Play F.



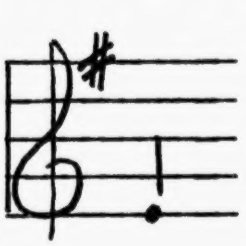


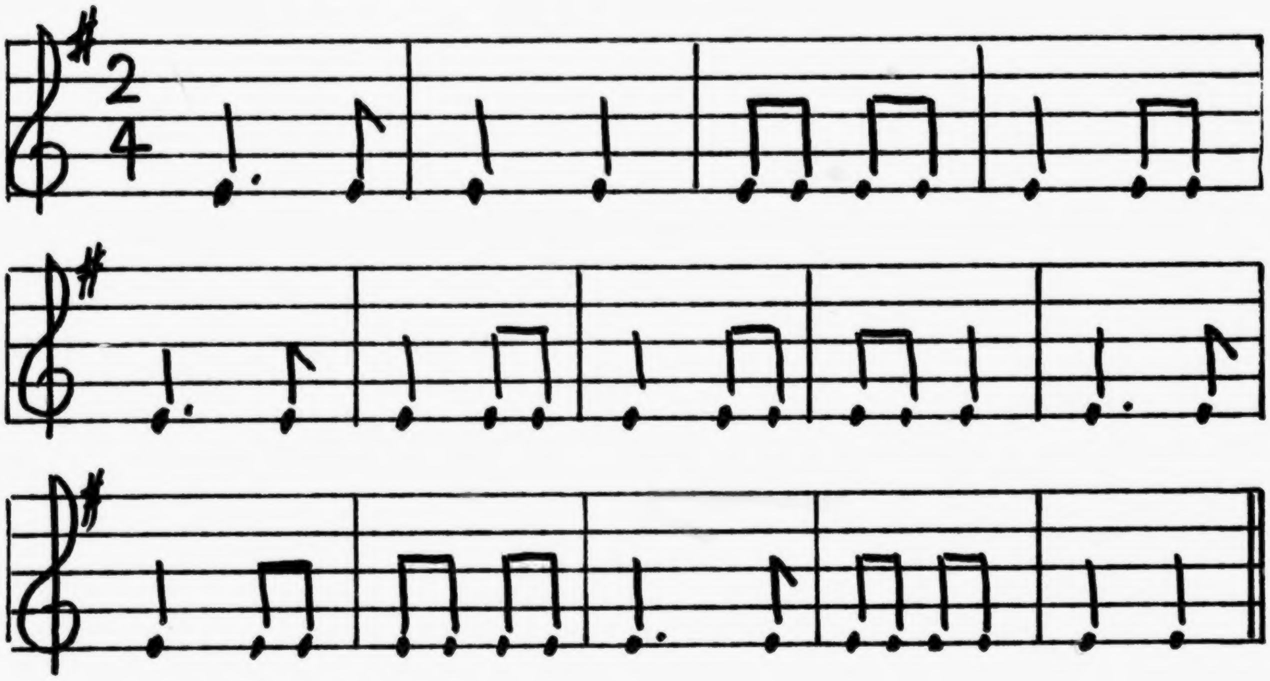
Item 143. ♩ - 96 Play D



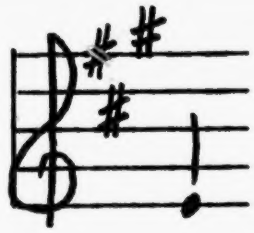


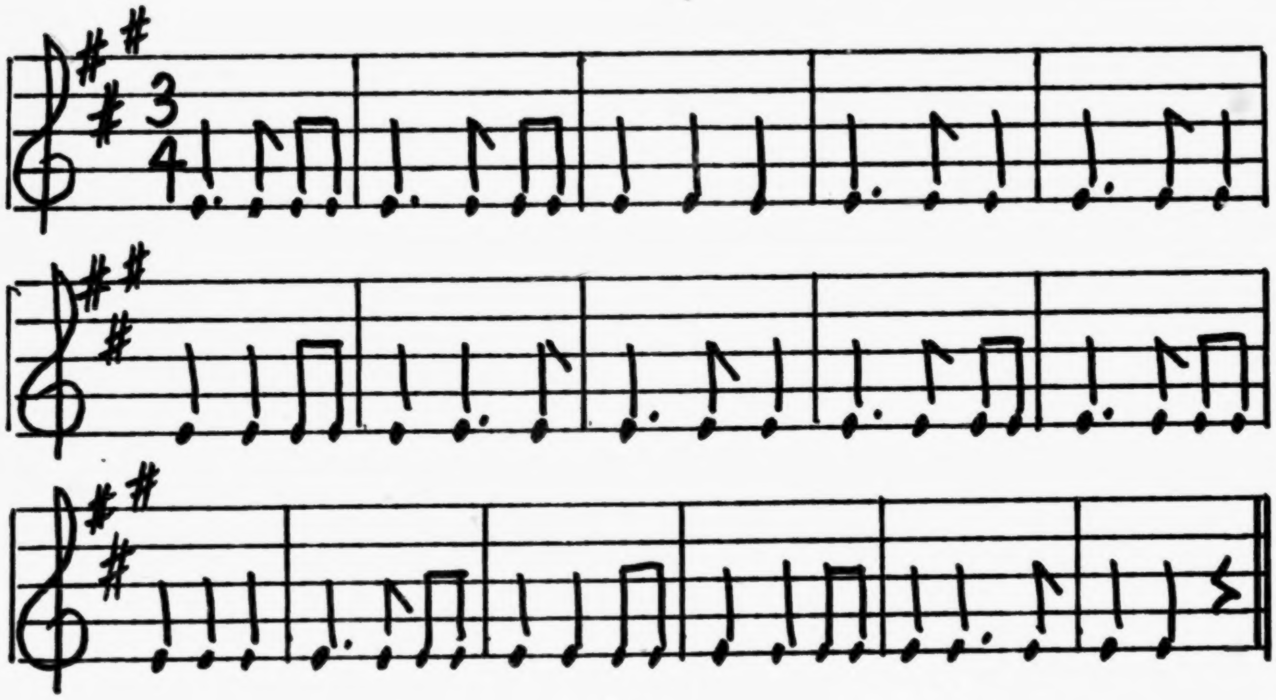
Item 144. ♩ - 72 Play E



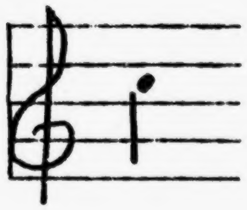


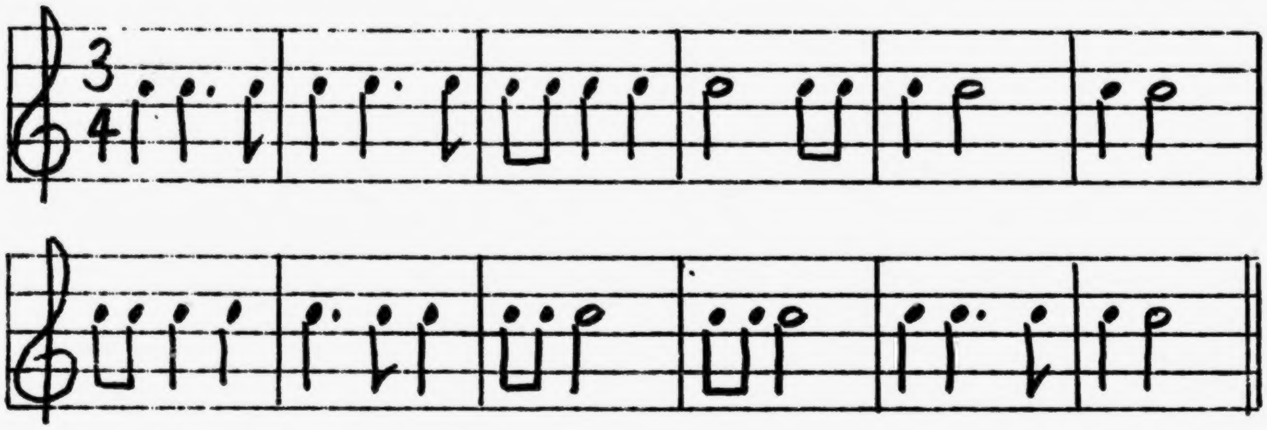
Item 145. ♩ - 96 Play E



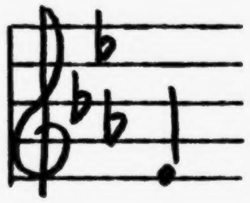


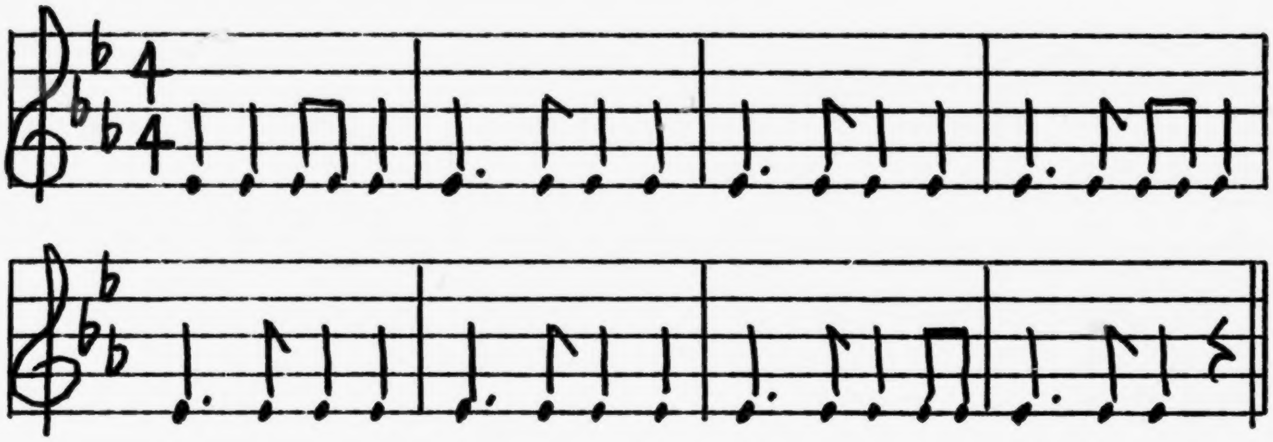
Item 146. ♩ - 112 Play C

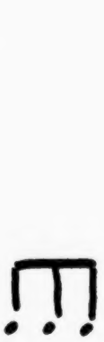




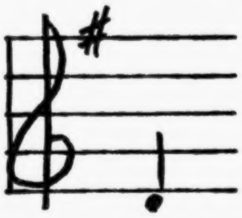
Item 147. ♩ - 72 Play E-flat

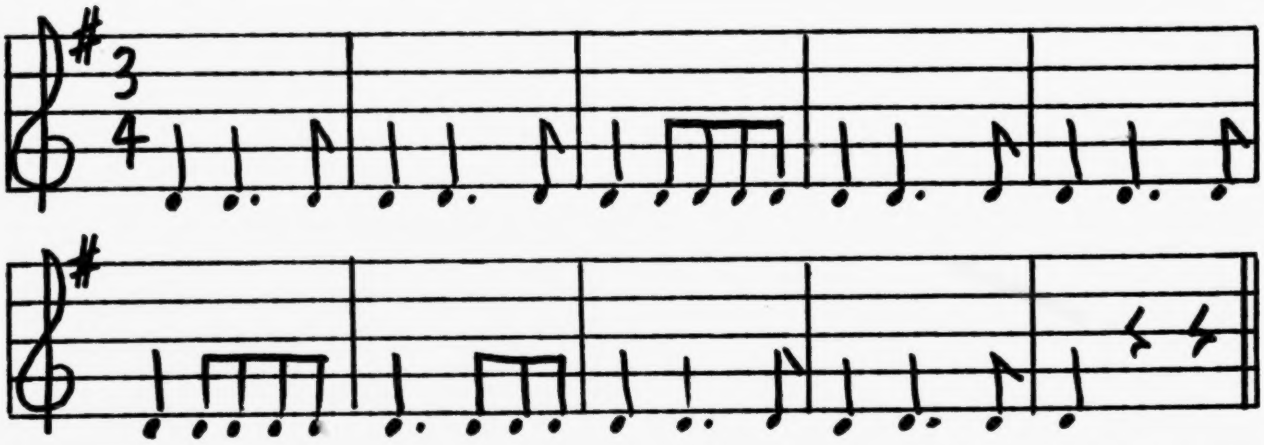


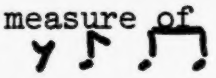


Item 148. Three eighth-notes can be written like this: 

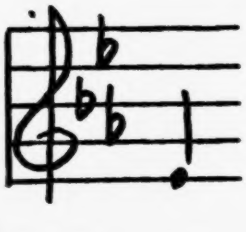
♩ - 88 Play D

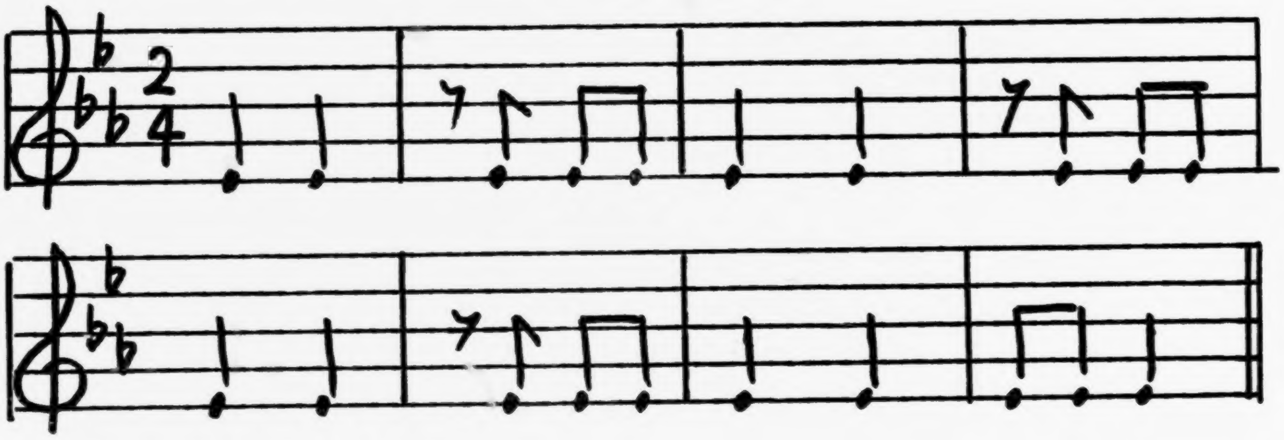




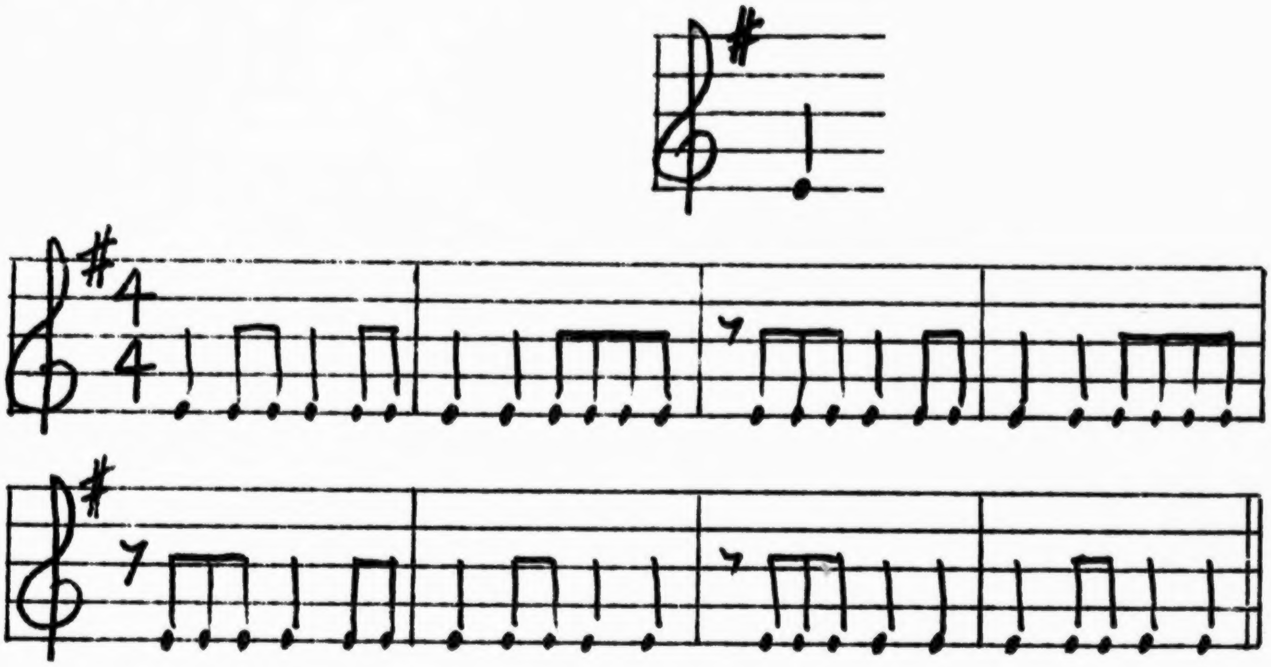
A final type of subdivision uses the eighth-rest (𝄾). For example, the eighth-rest may replace the first eighth-note in a measure of four eighths, resulting in the following pattern: 2/4 

Item 149. ♩ - 80 Play E-flat

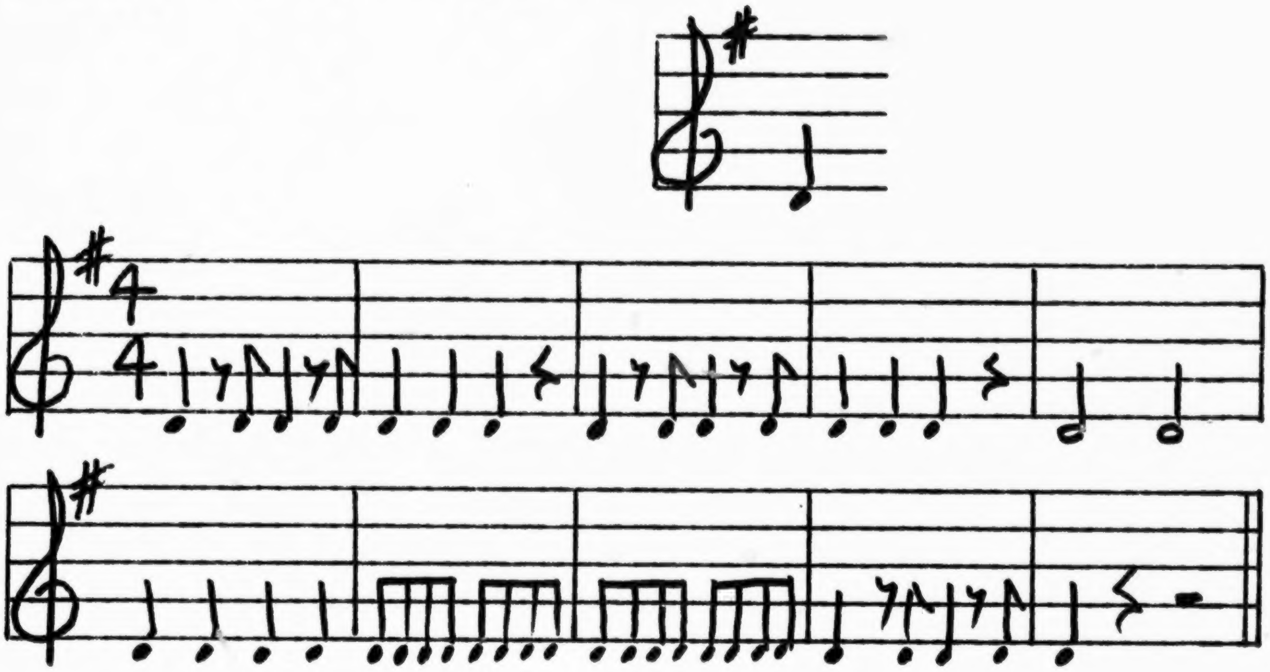




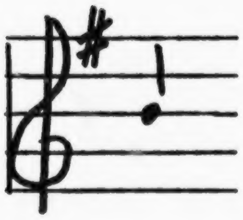
Item 150. ♩ - 96 Play E

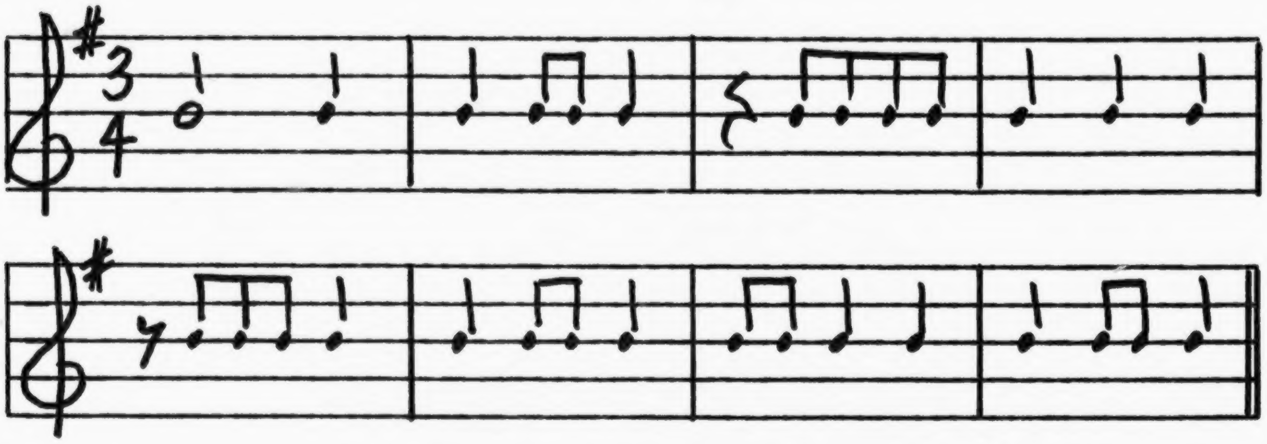


Item 151. ♩ - 96 Play D

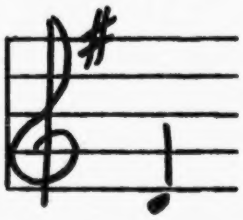


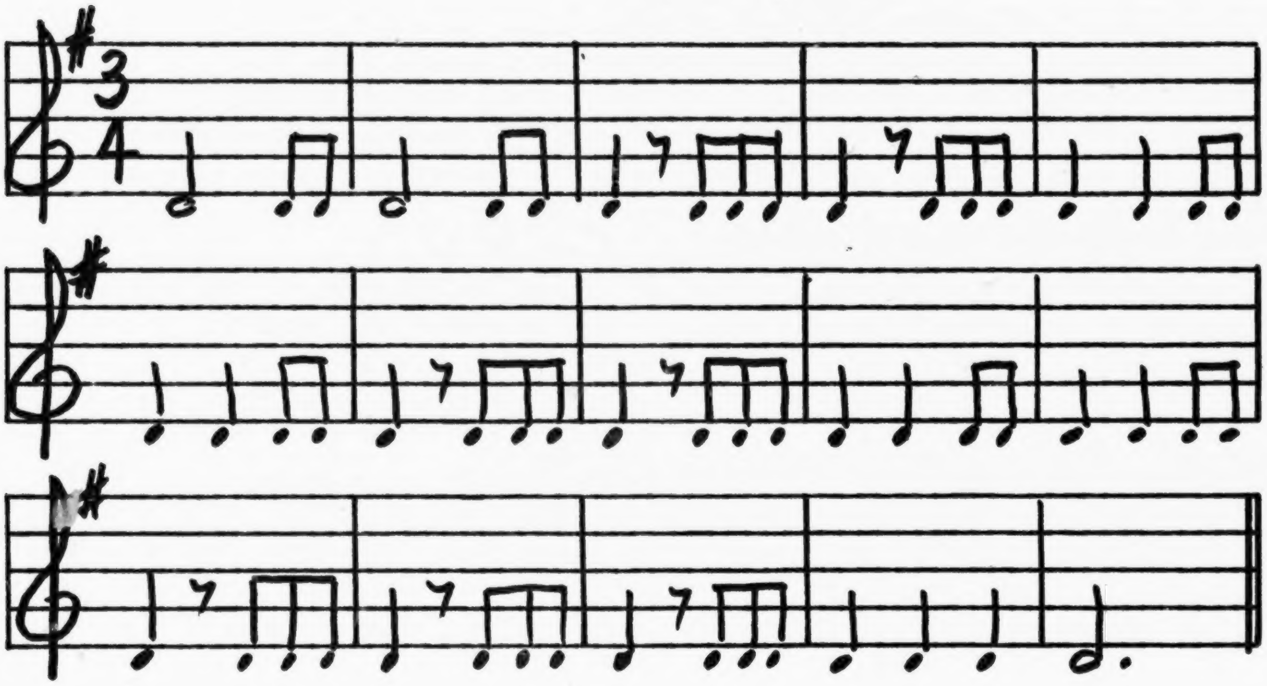
Item 152. ♩ - 104 Play B



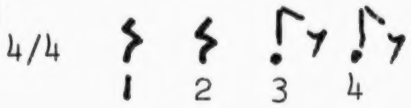


Item 153. ♩ - 96 Play D

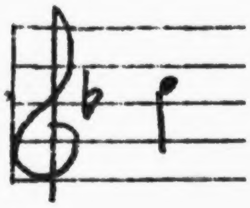


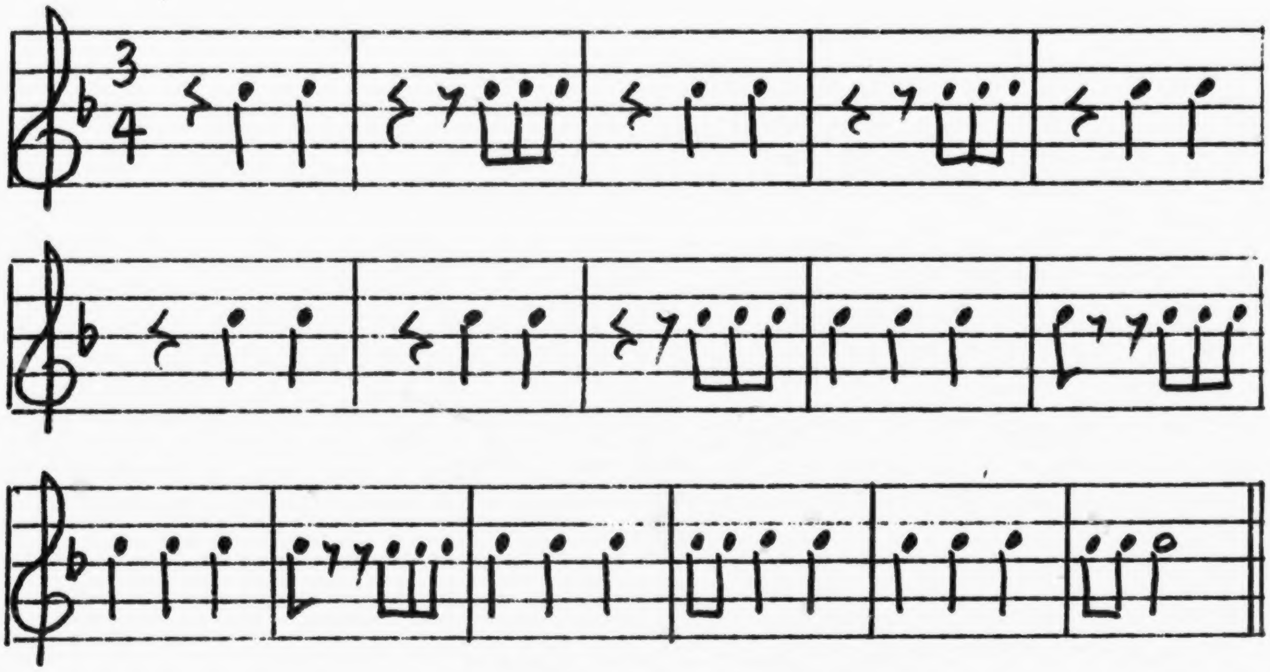


Item 154. When the eighth-rest (𝄾) is used in place of the second half of the beat, we have, for example:

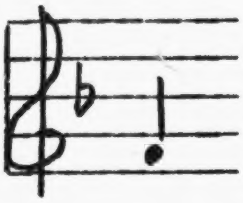


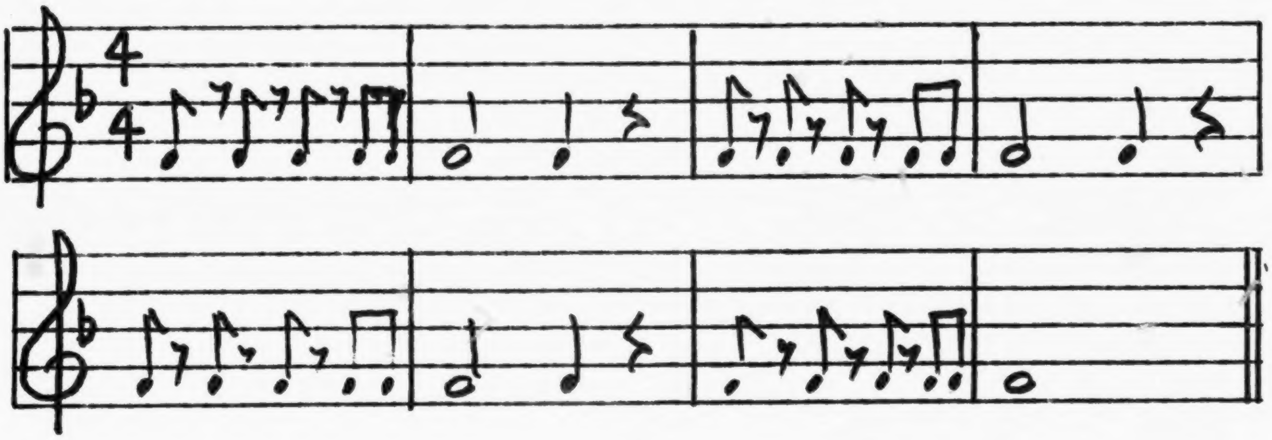
♩ - 104 Play C



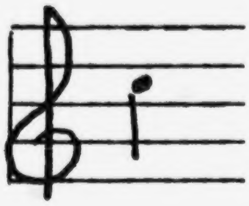


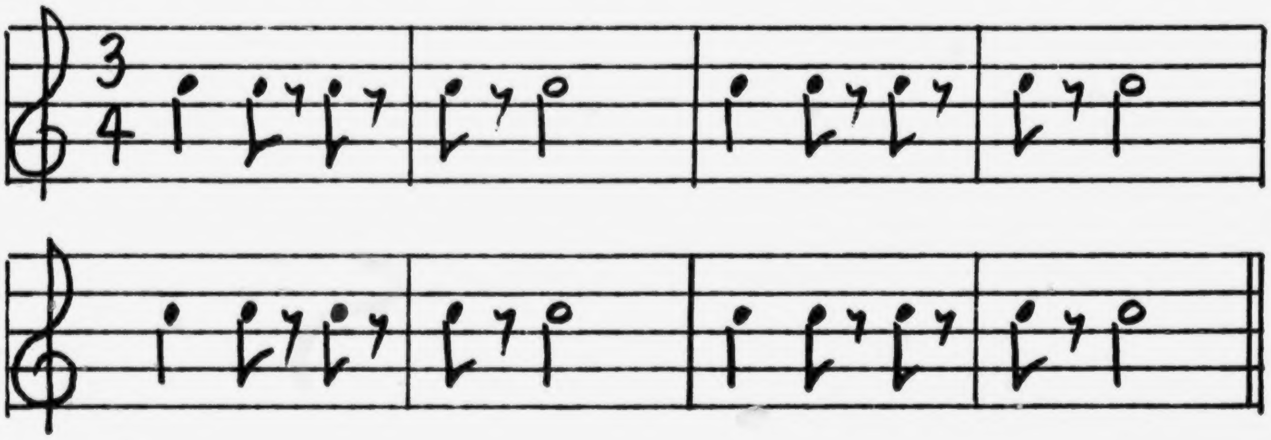
Item 155. ♩ - 96 Play F



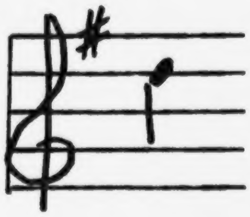


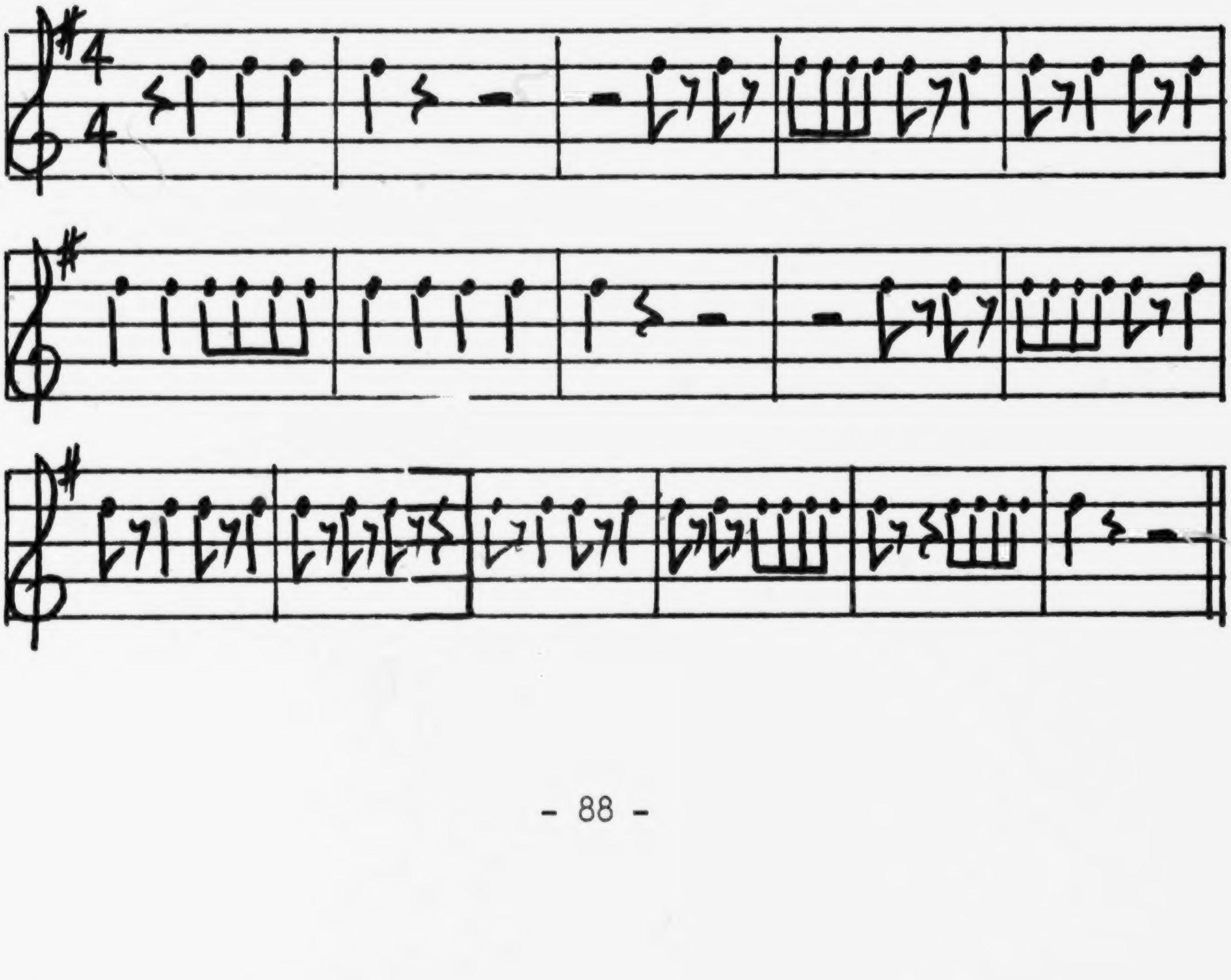
Item 156. ♪ - 126 Play C



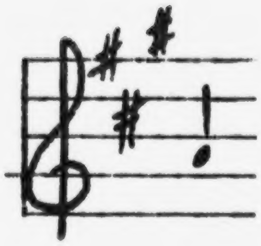


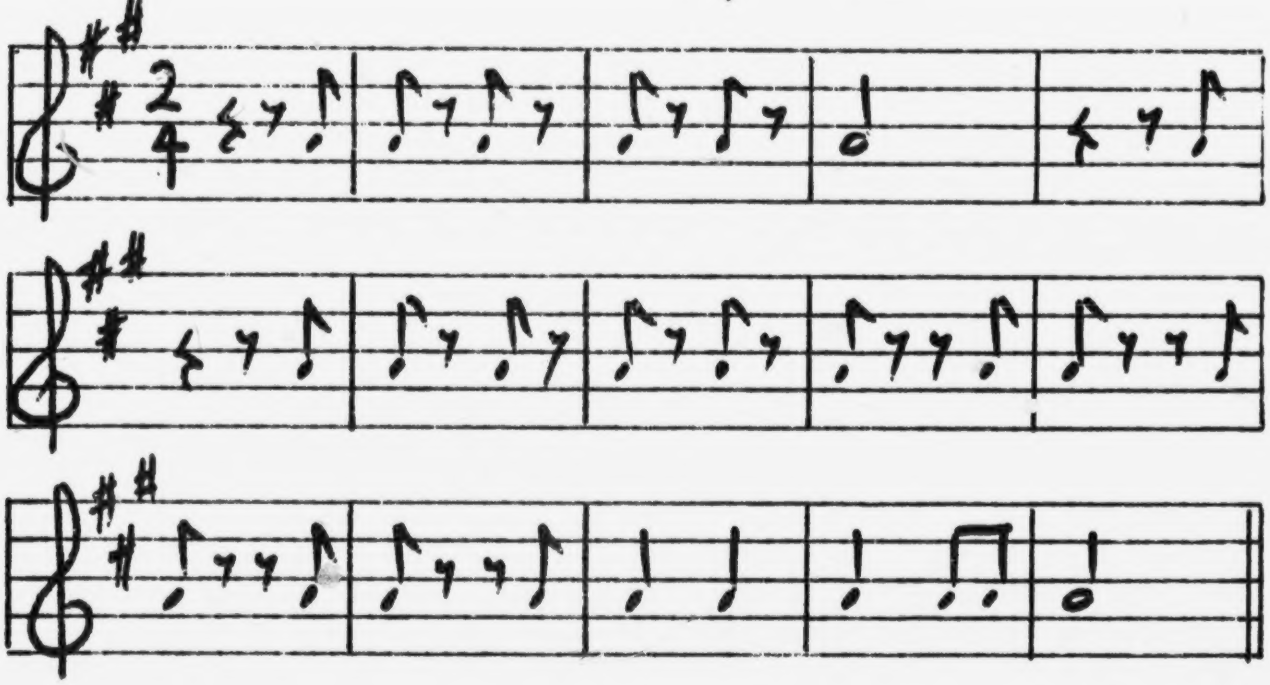
Item 157. ♪ - 126 Play D



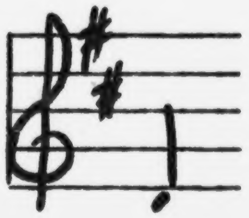


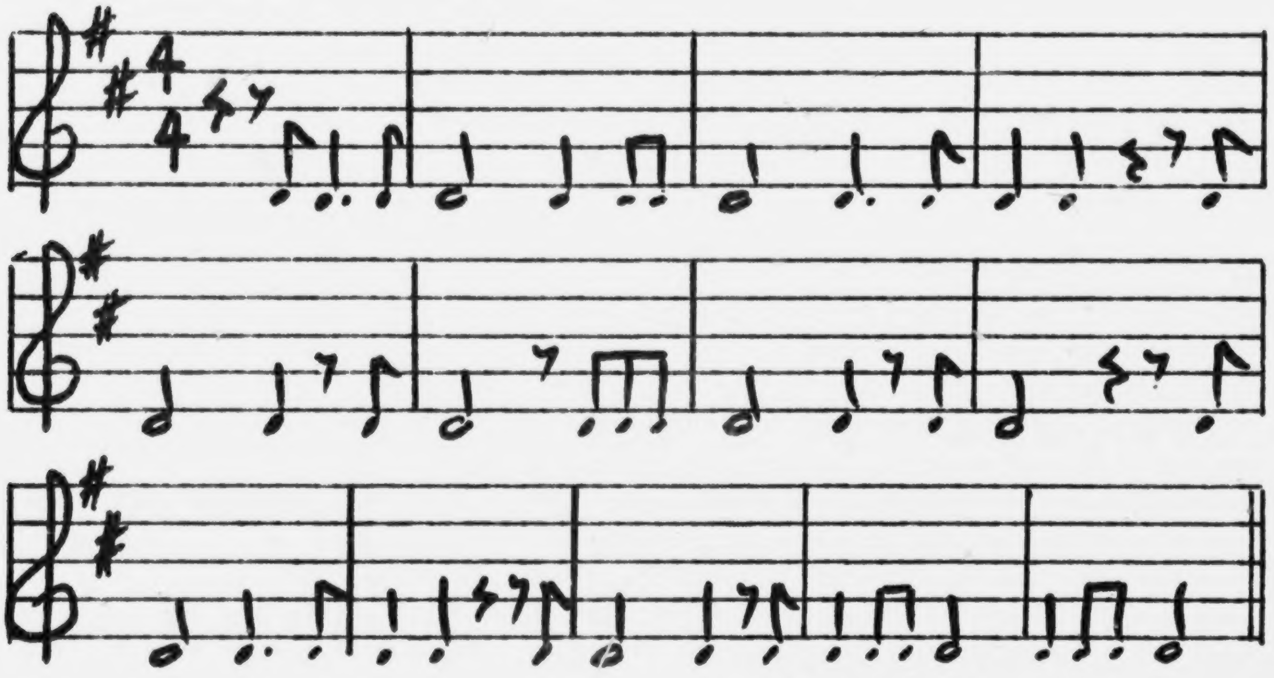
Item 158. ♩ - 72 Play A



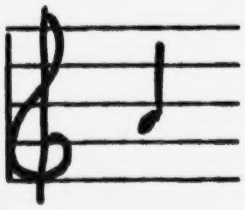


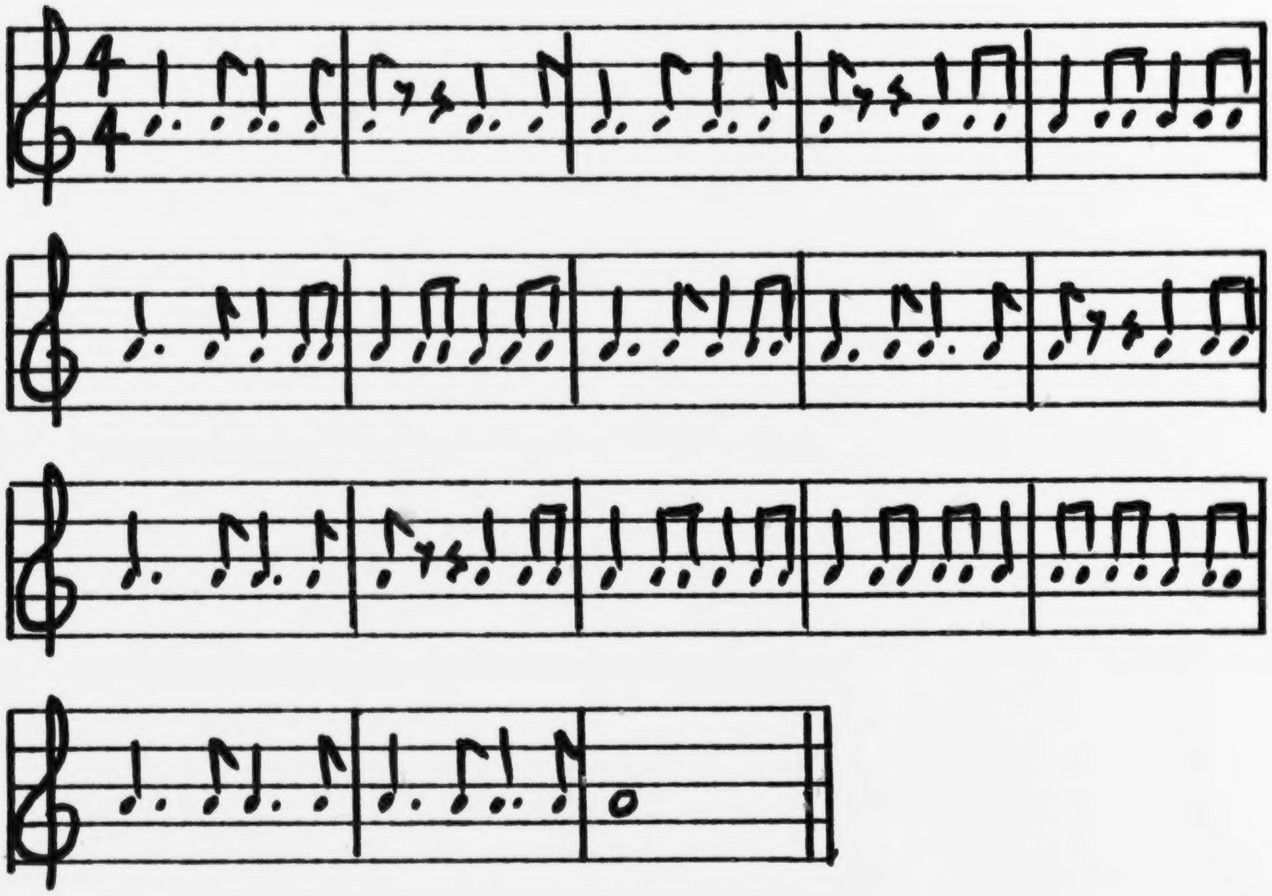
Item 159. ♩ - 60 Play D

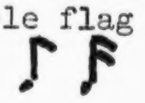




Item 160. ♩ - 72 Play A

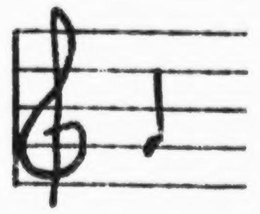




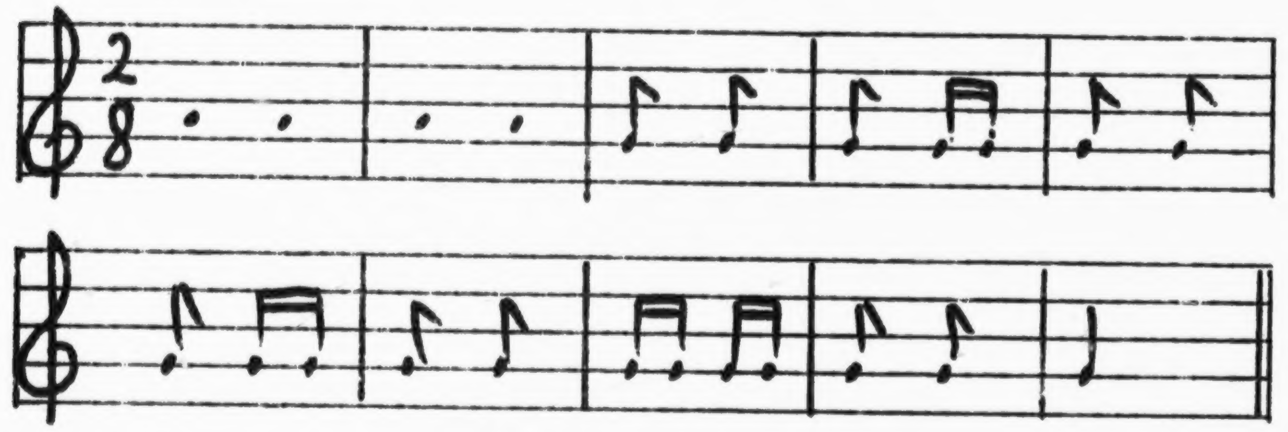
Item 161. If we divide the eighth-note into two equal sections, the result is two sixteenths, or one sixteenth-note with a one-sixteenth rest. Notice the double flag on the sixteenth, and the single flag on the eighth. 

The metronome ticks in eighths, and you are required to tap in sixteenths as well as in other combinations.

Play G

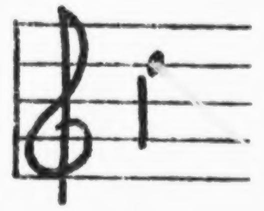


♪ - 72

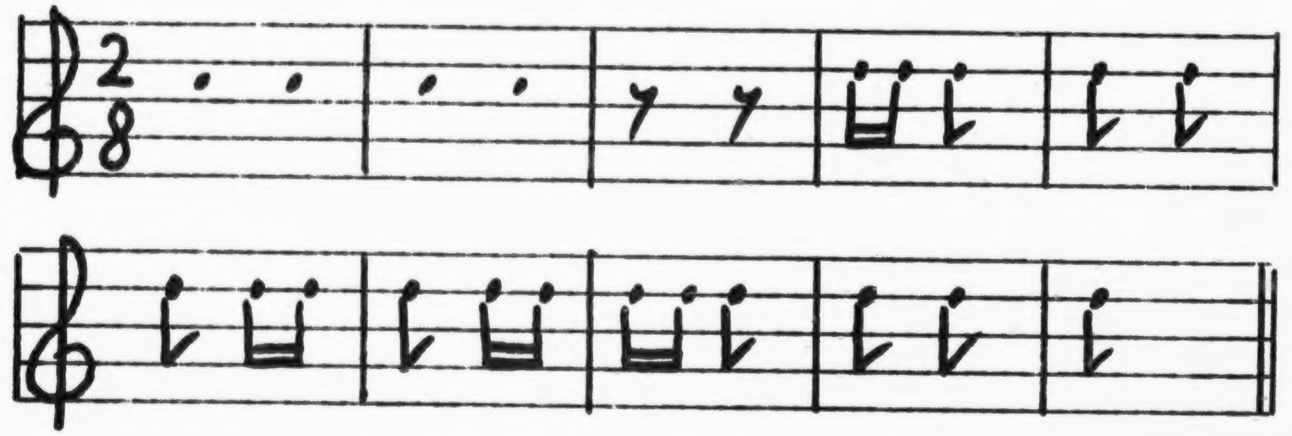


Item 162.

Play D

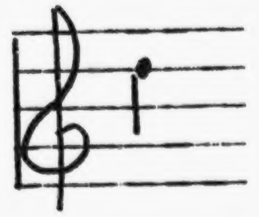


♪ - 108

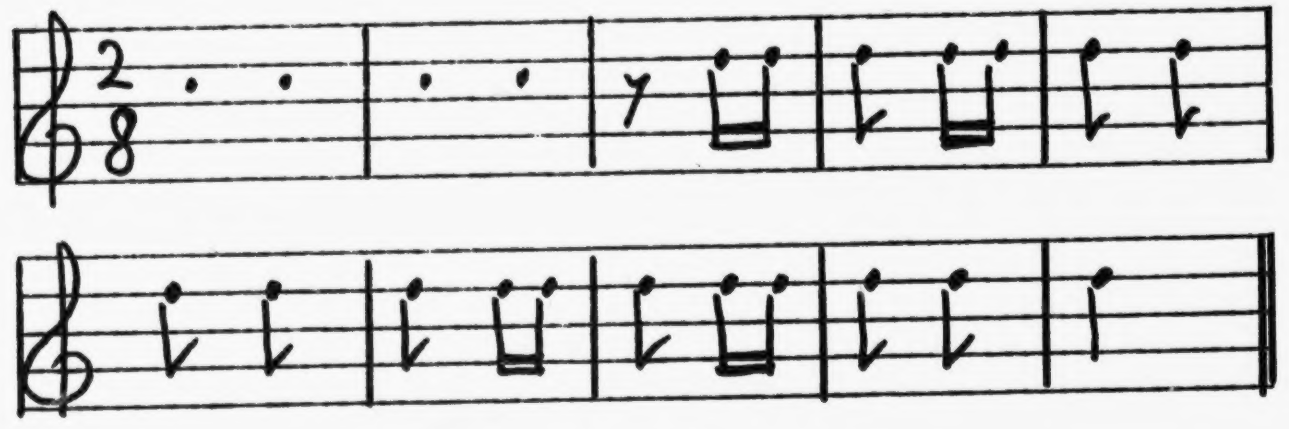


Item 163.

Play D

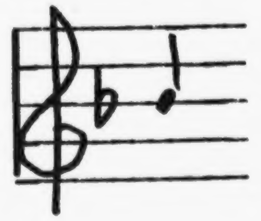


♪ - 112

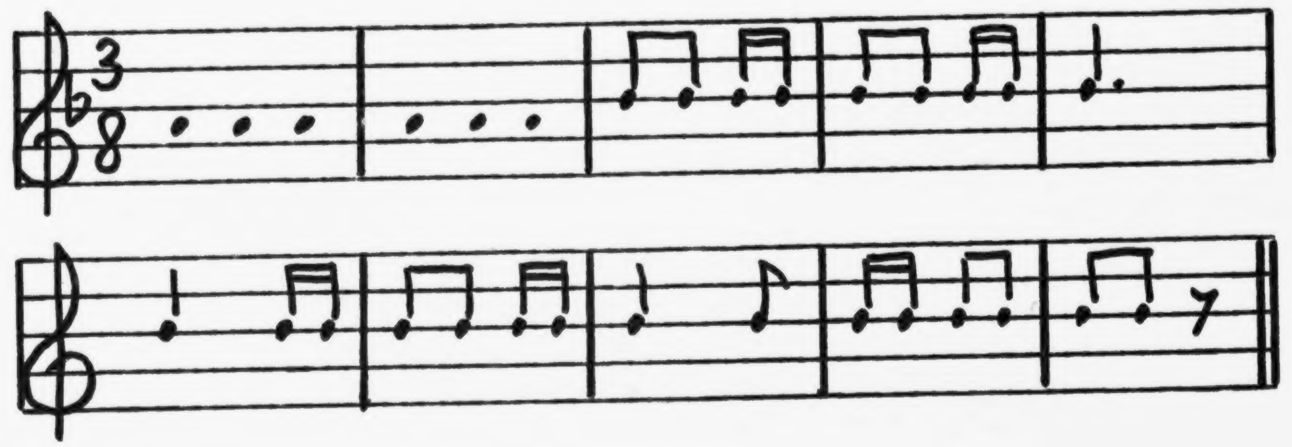


Item 164. In 3/8 meter, with three eighth-note beats per measure, we have similar groupings.

Play B-flat

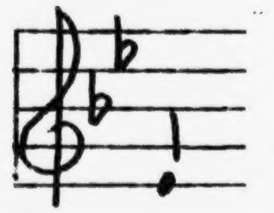


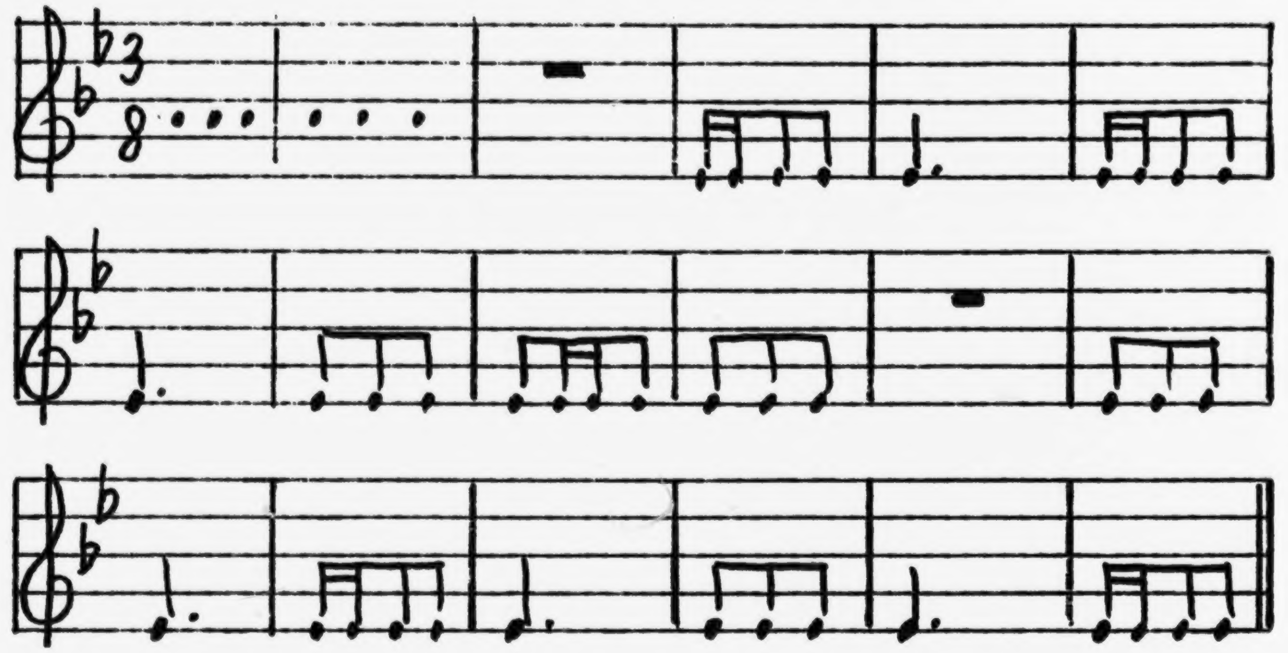
♪ - 112



Item 165.

Play E-flat ♪ - 120

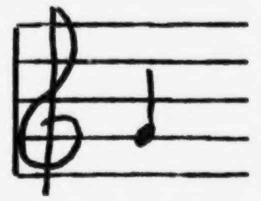


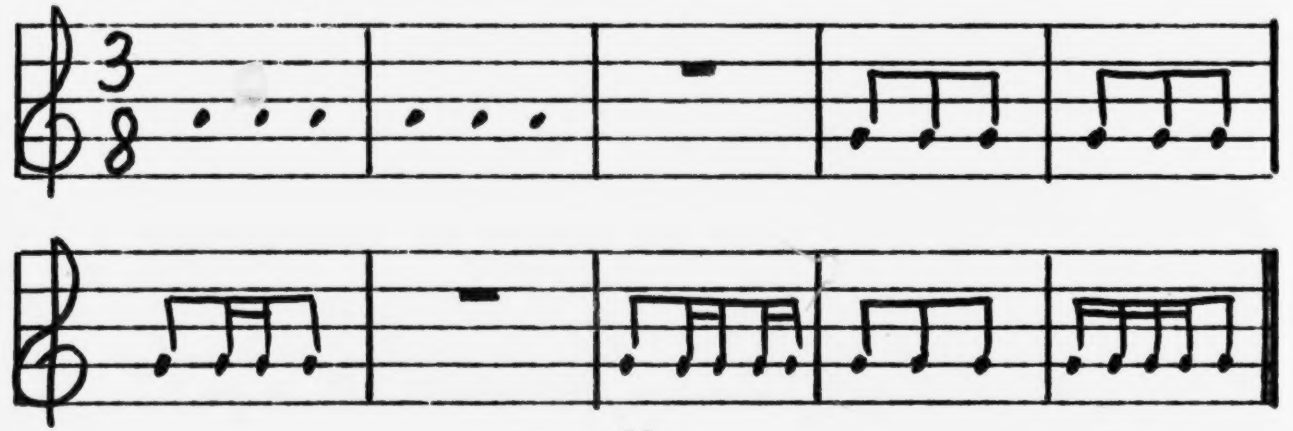


Item 166. The five horizontal lines used in musical notation are called a STAFF. The symbol you see at the beginning of each staff is called a TREBLE CLEF, or also a G CLEF since it places G on the second line.

MIDDLE C lies at about the center of the keyboard, and the treble clef is generally used for notes which are above middle C.

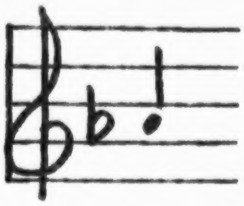
Play G ♪ - 108



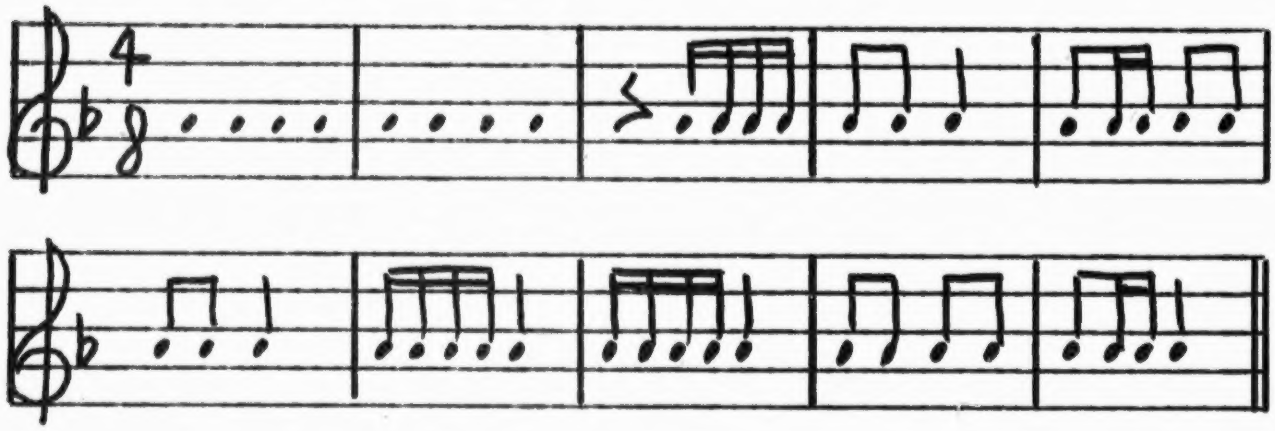


Item 167. The same in 4/8 meter with four eighths in a measure.

Play A-flat

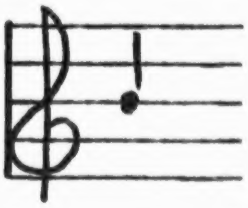


♪ - 108

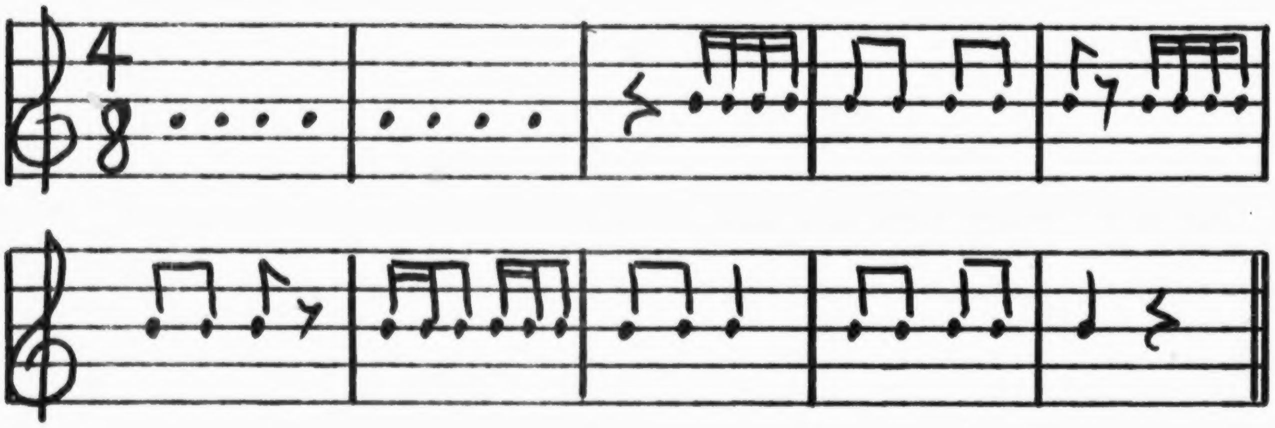


Item 168.

Play B

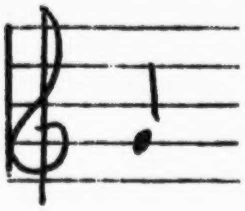


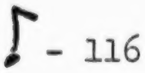
♪ - 104

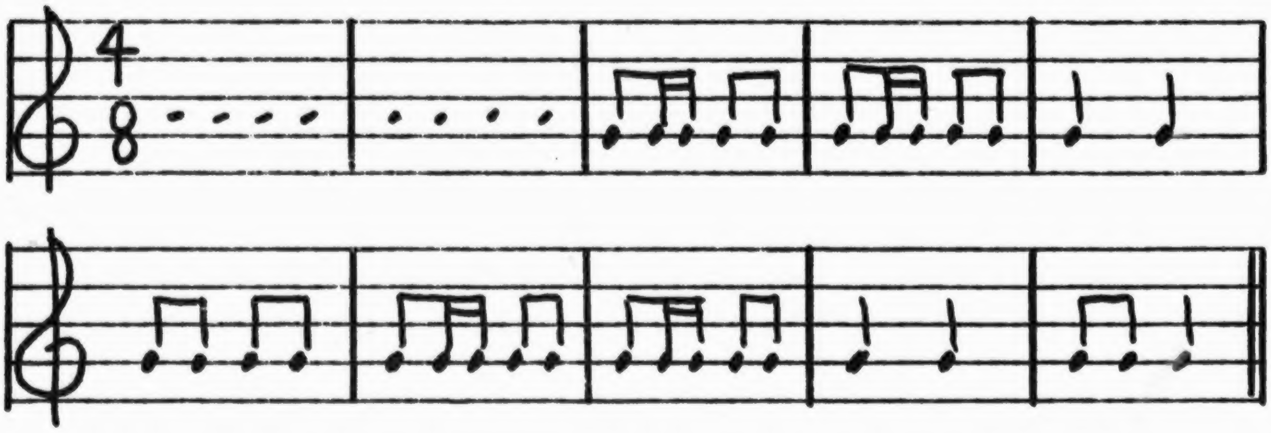


Item 169.

Play G





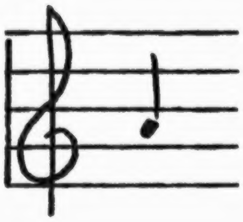


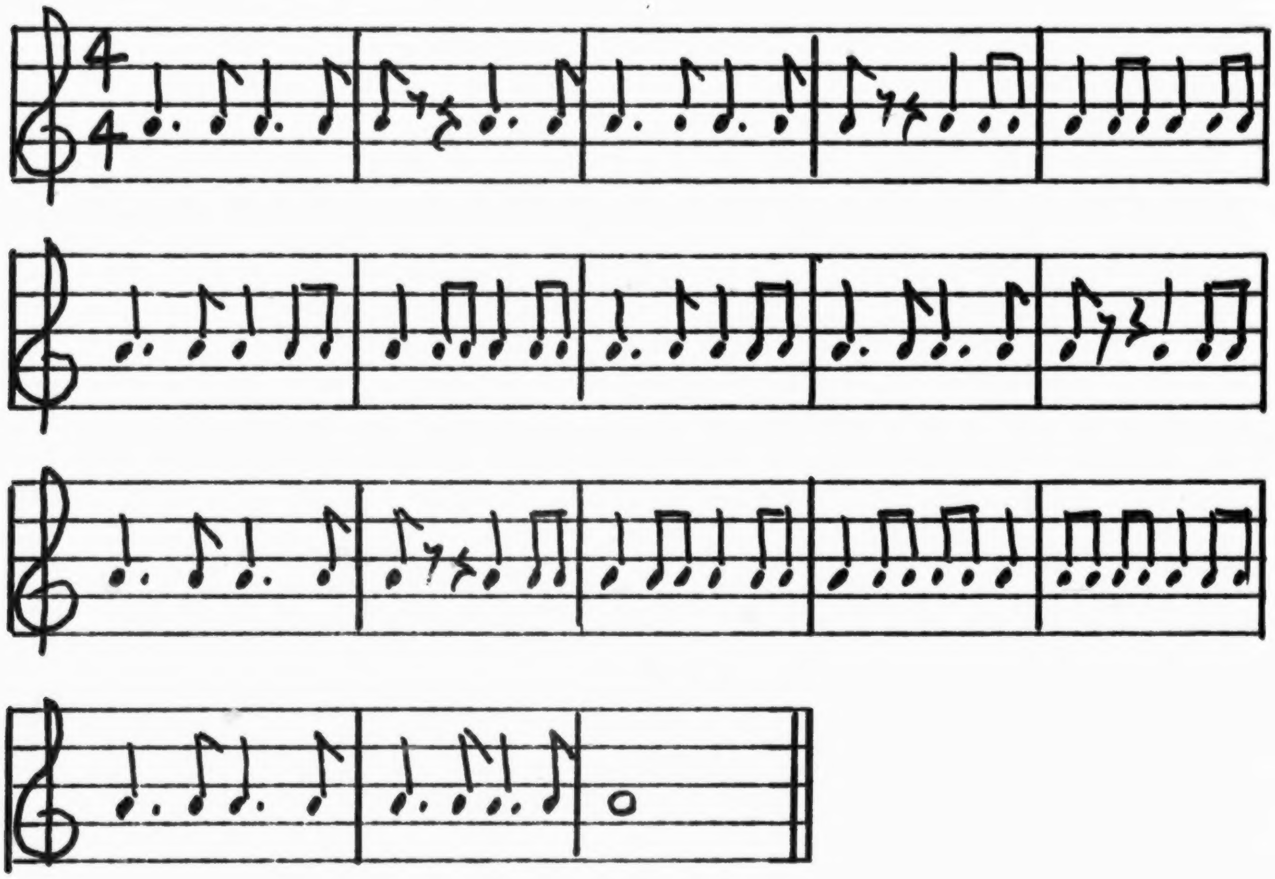
Item 170. The last series of items contained sixteenth-note divisions of the eighth-note beat.

The series before that contained dotted-quarters followed by eighths with a quarter-note beat.

This is a review of one of those items.

♩ - 72 Play A



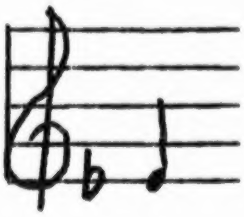


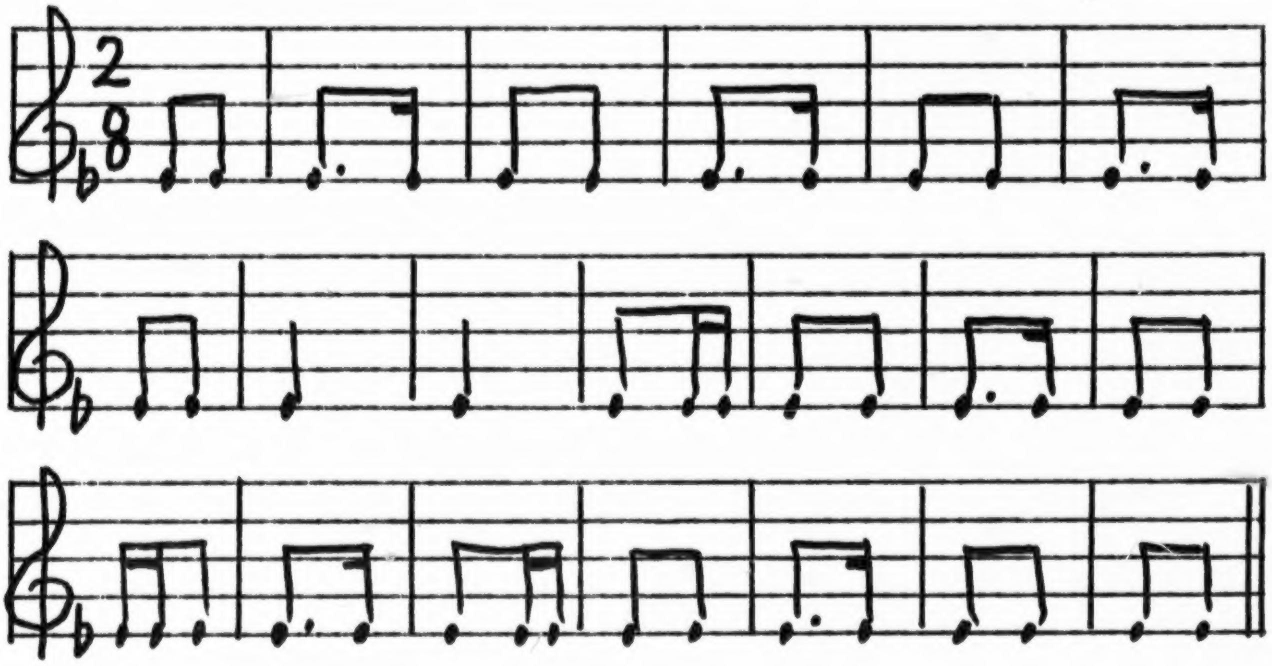
Item 171. Now we will have the same arrangement of beats using the eighth-note beat instead of the quarter. Notice the similarity between the two examples:

Ex. A 2/4 ♩. ♪ Ex. B 2/8 𝅘𝅥𝅮. 𝅘𝅥𝅯 or

Remember, we are counting in eighth-note beats.

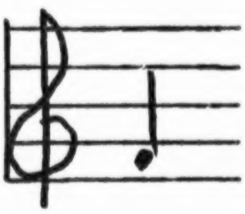
♩ - 72 Play E-flat

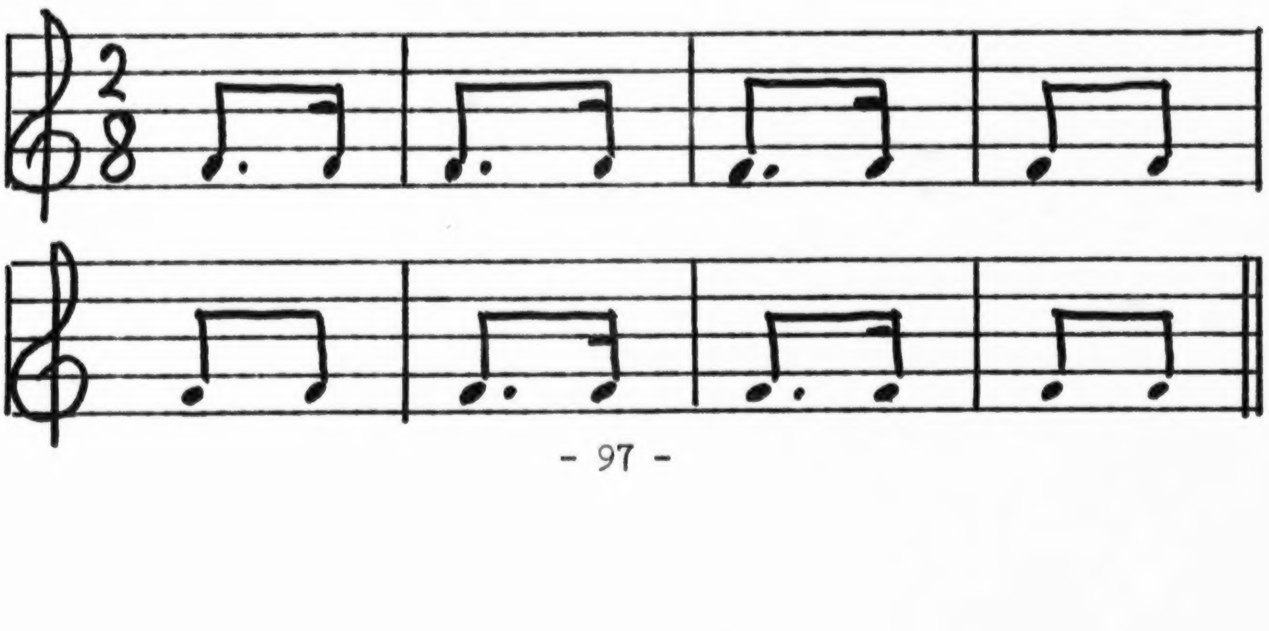




Item 172. ♪ - 120

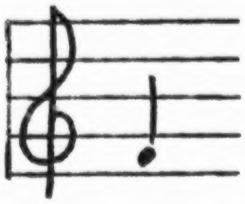
Play F

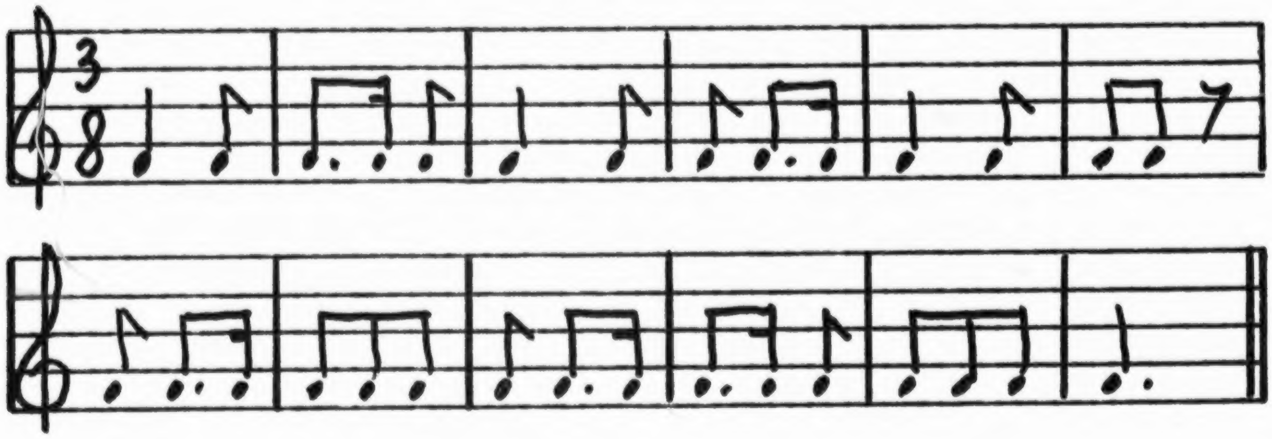




Item 173.

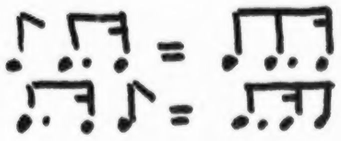
♪ - 100 Play F.

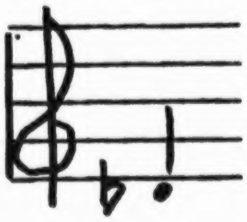


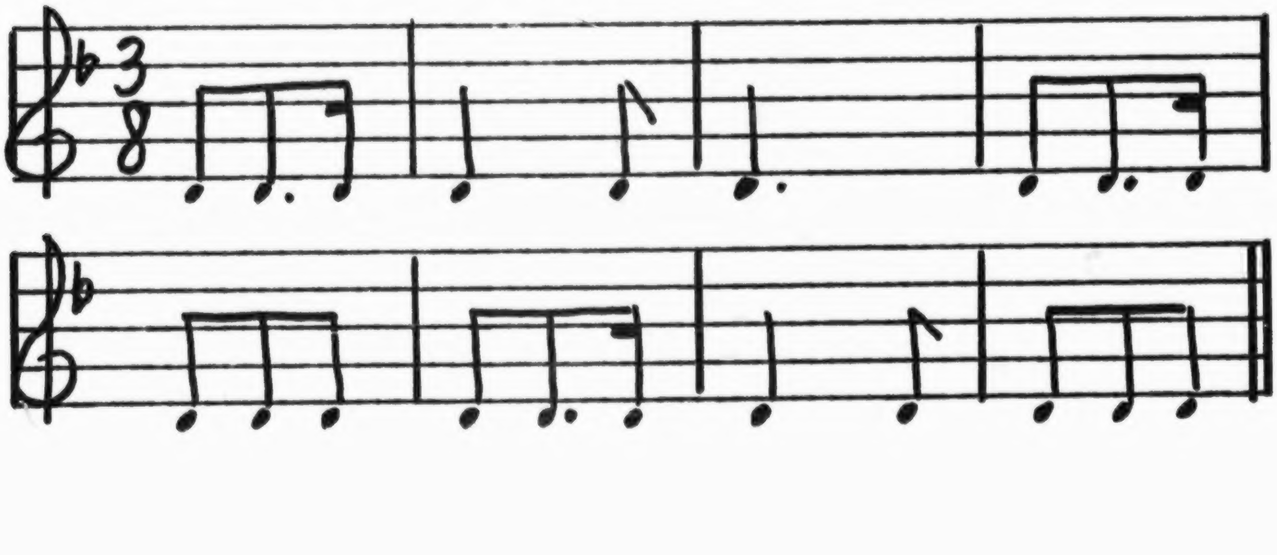


Item 174.

♪ - 116 Play D-flat

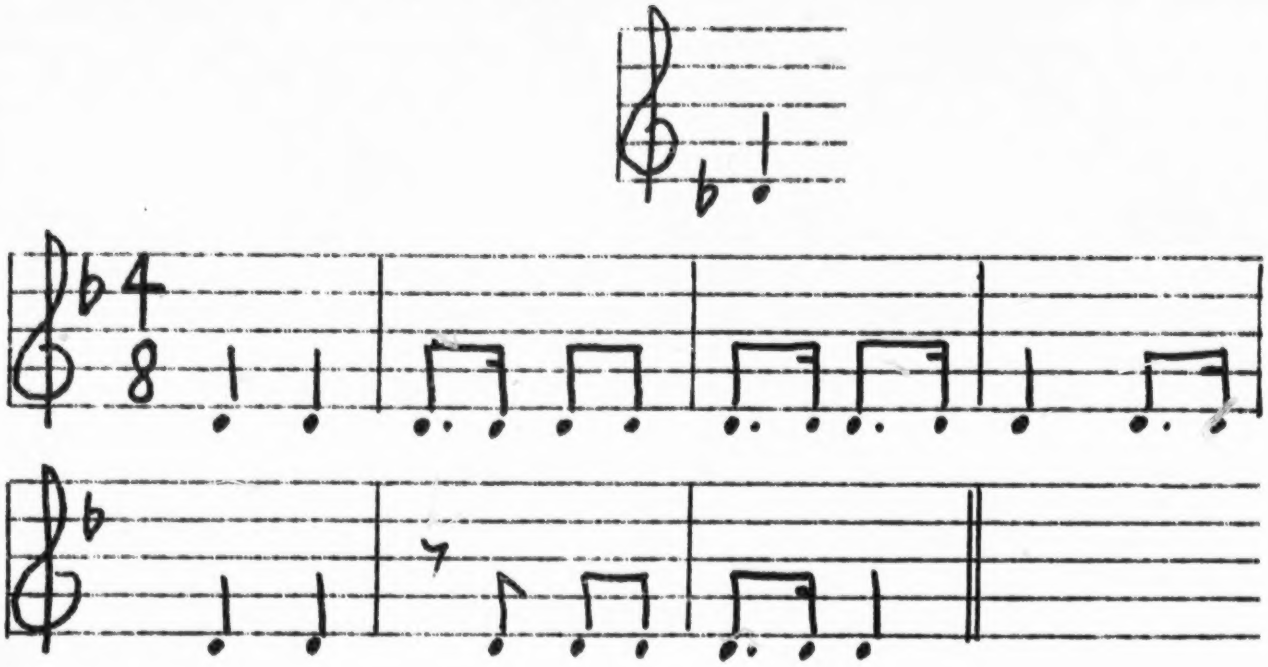






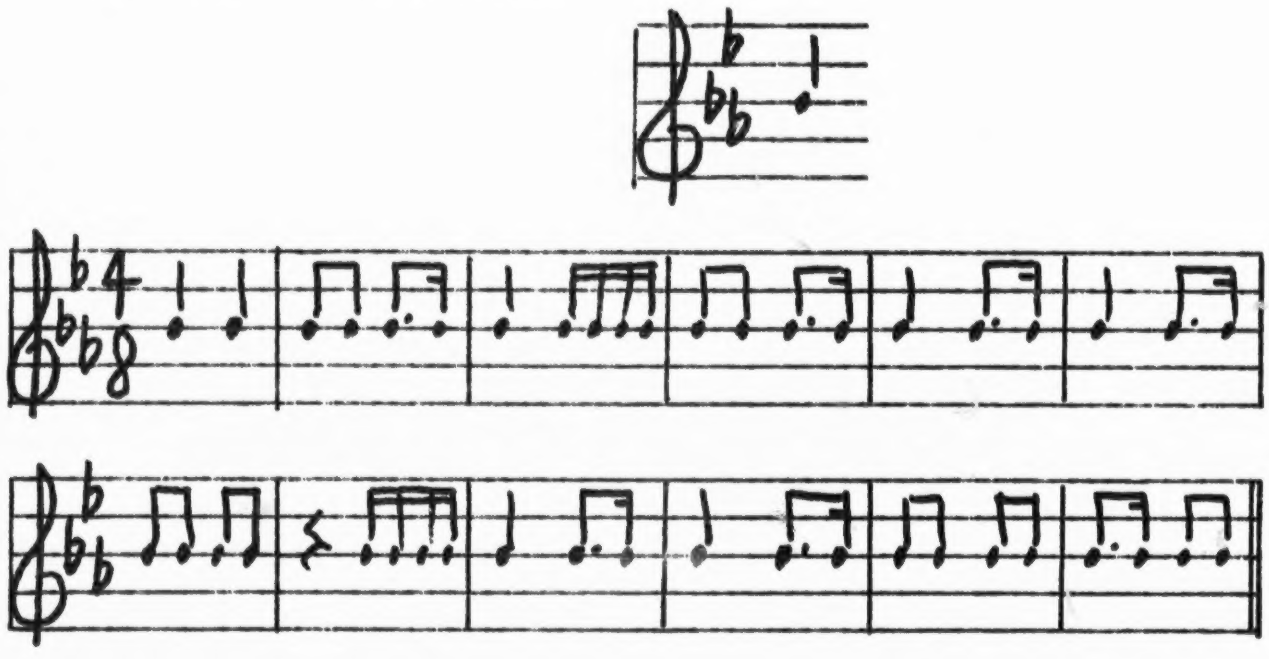
Item 175.

♪ - 84 Play D-flat



Item 176.

♪ - 112 Play B-flat

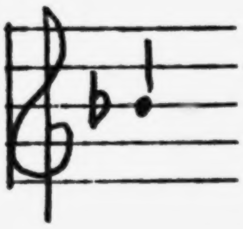


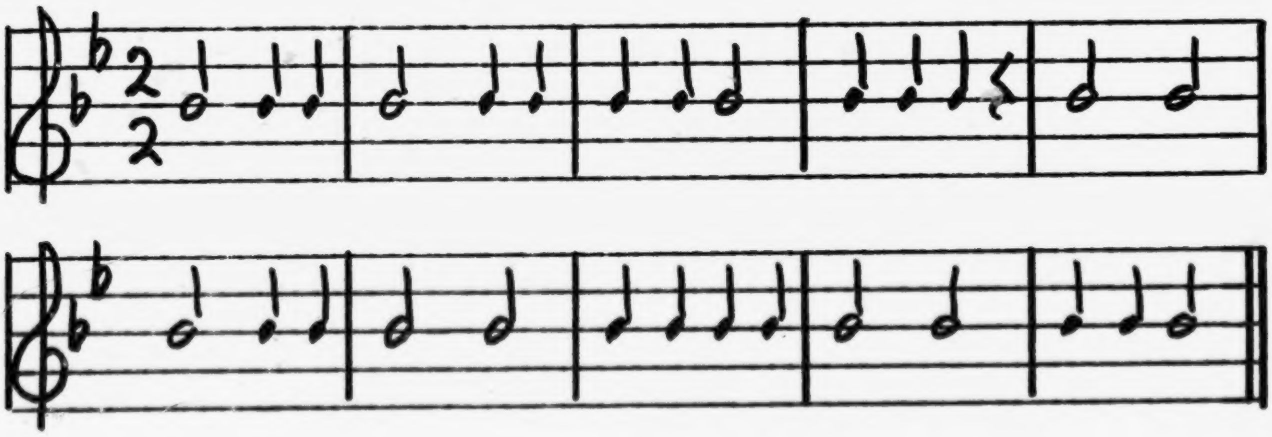
Item 177. So far you have encountered material using either the quarter or the eighth as a beat. With the introduction of the half-note as a beat, the problem becomes more difficult. Remember that there are two quarters in a single beat, and that the metronome will sound in half-note beats.

The groupings are: two quarters, or a single quarter with a quarter rest.

Play B-flat

𝅗𝅥 _ 66

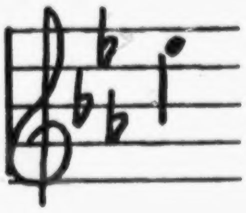


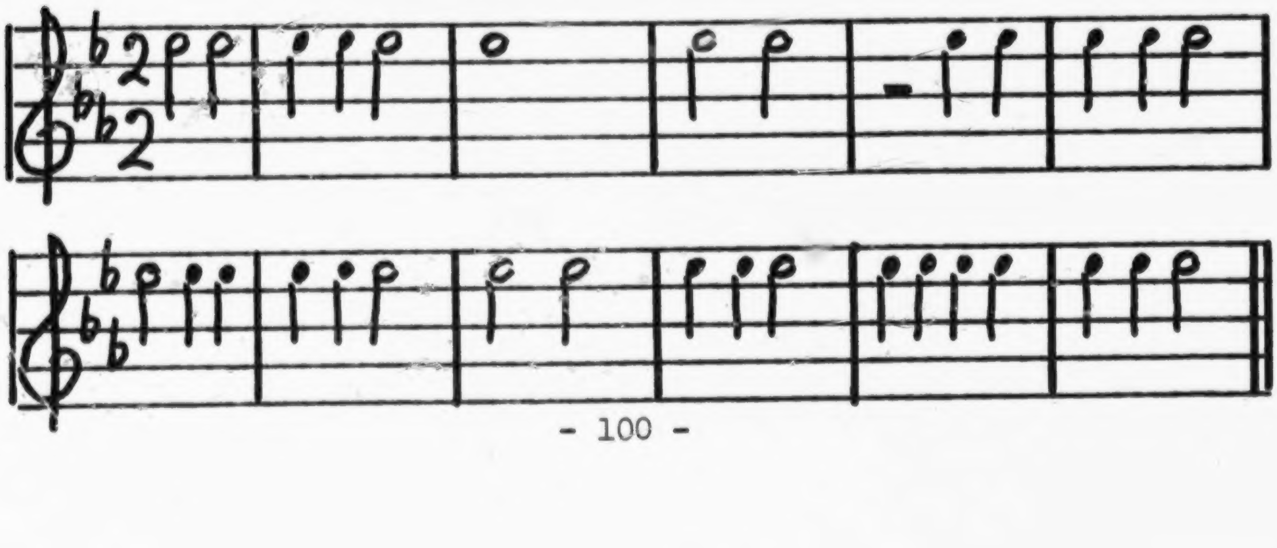


Item 178.

Play E-flat

𝅗𝅥 - 76

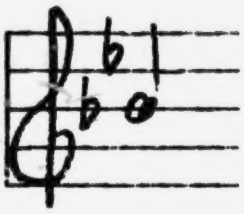


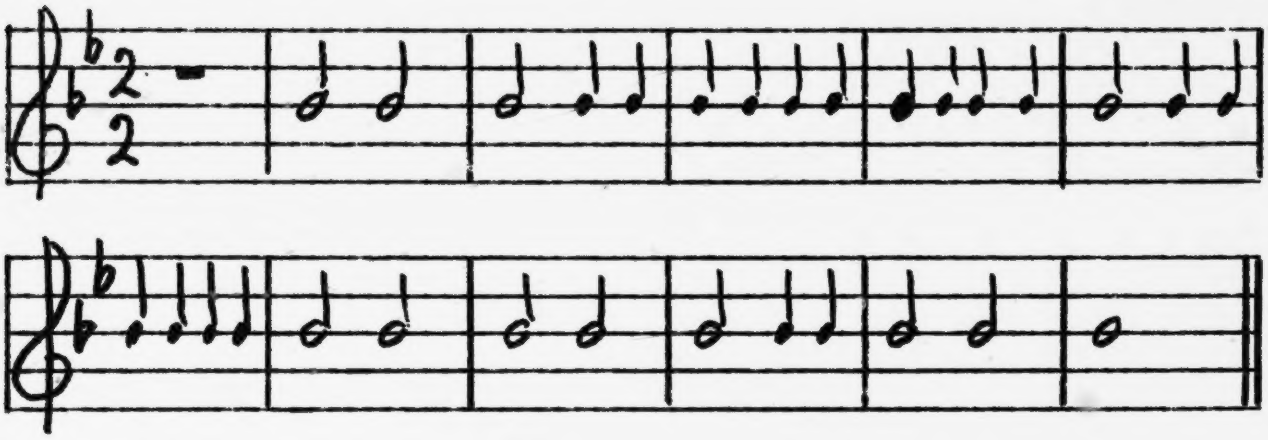


Item 179.

Play B-flat

𝅗𝅥 - 80

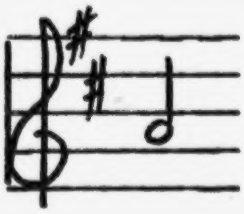


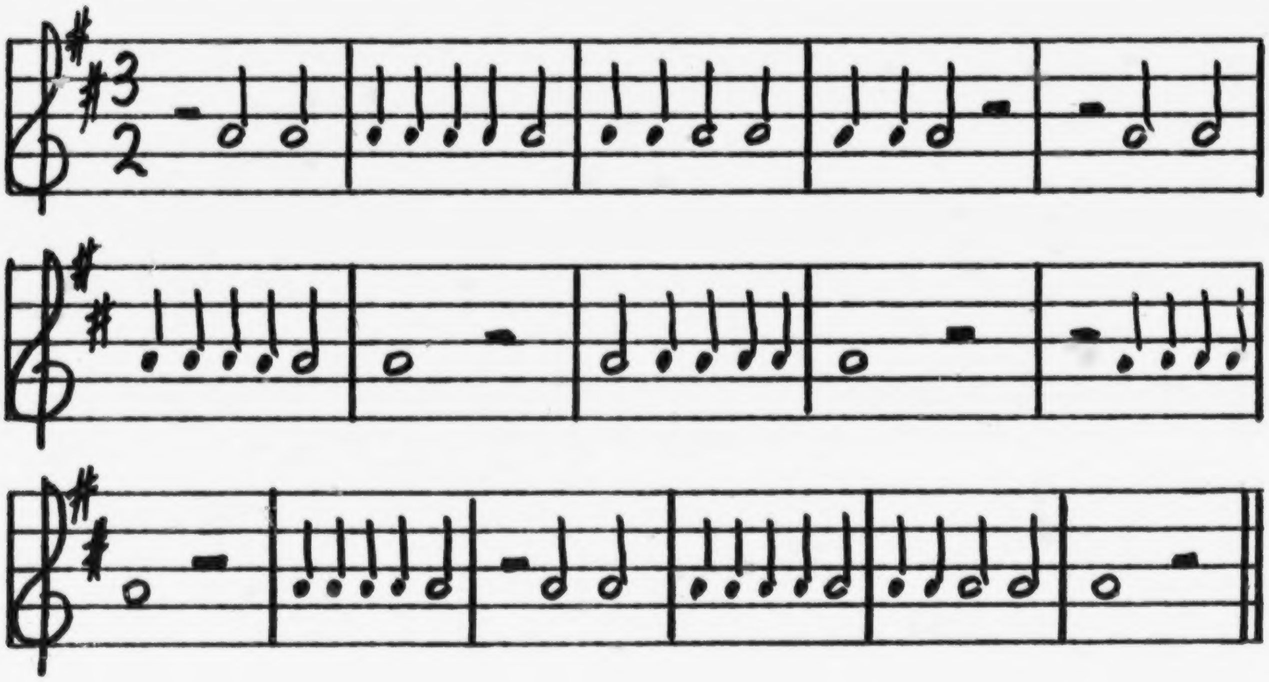


Item 180. Now, 3/2 meter has three units of half-note beats, each beat containing two quarters.

Play A

𝅗𝅥 - 100

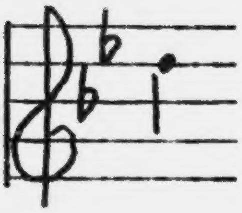


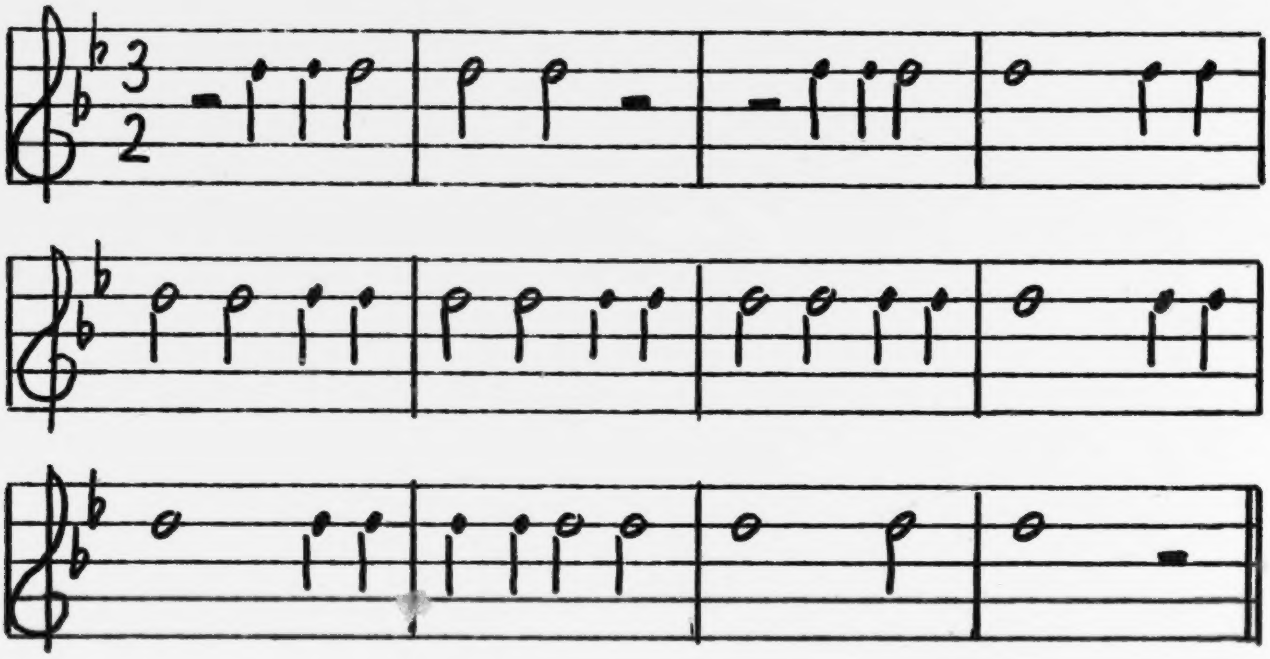


Item 181.

Play D

𝅗𝅥 - 100

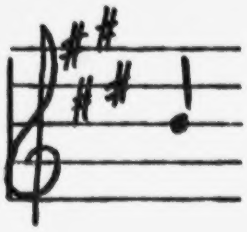


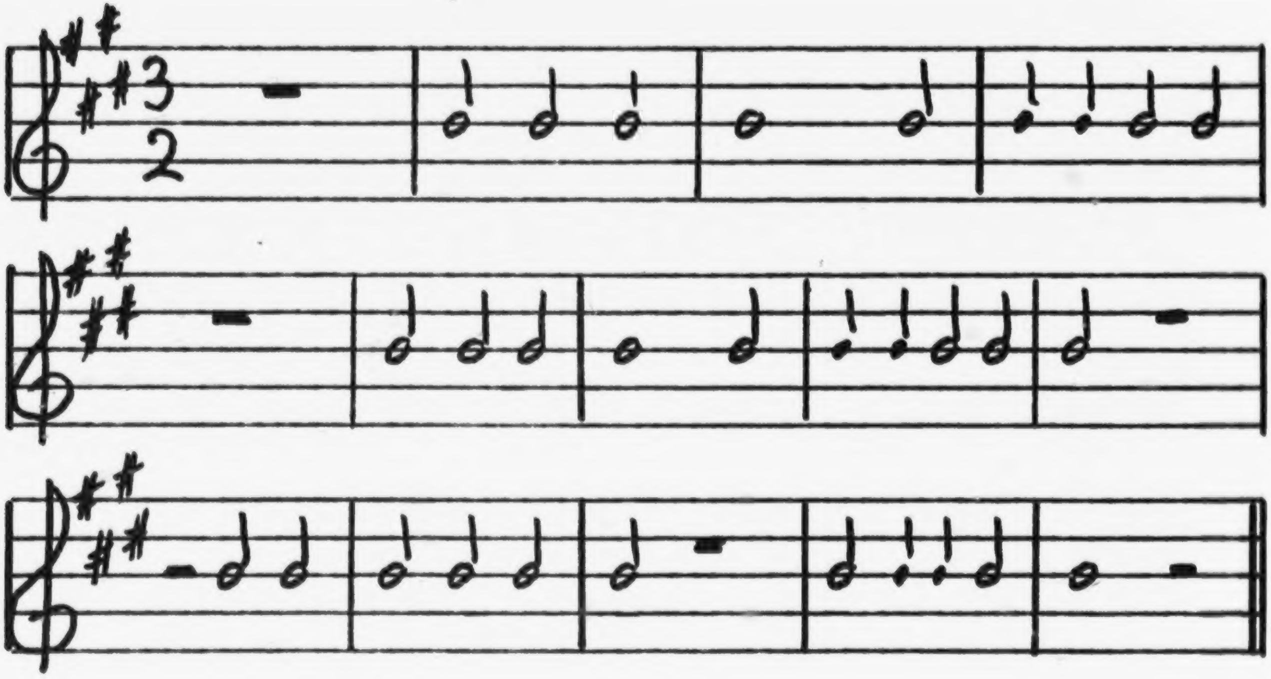


Item 182.

Play B

𝅗𝅥 - 88

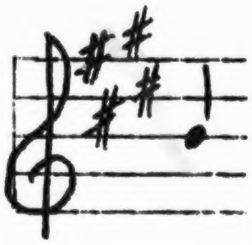


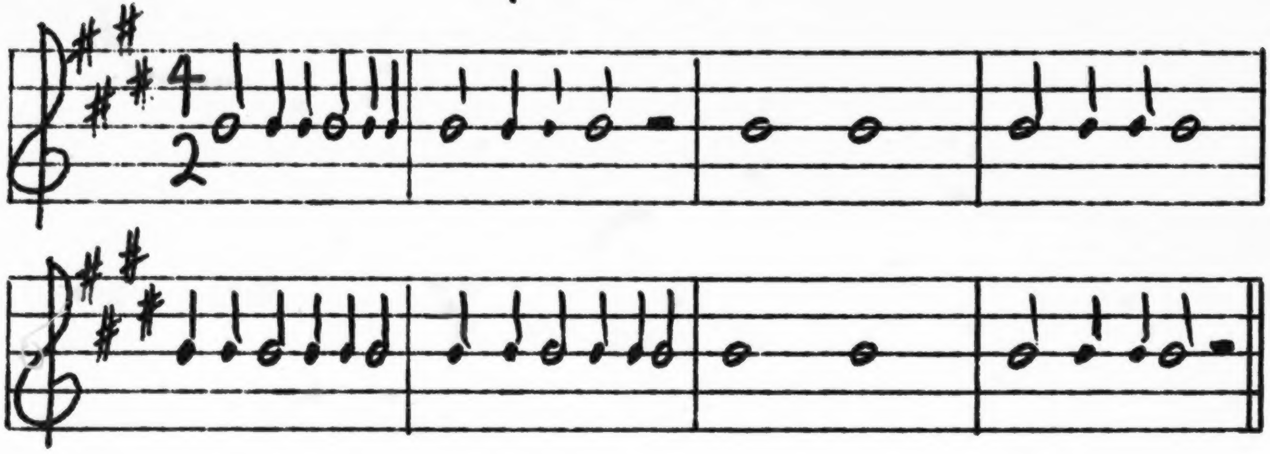


Item 183. 4/2 meter has four units of half-note beats.

Play B

𝅗𝅥 - 100

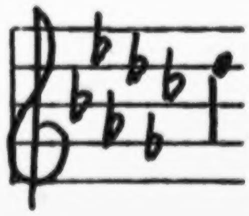


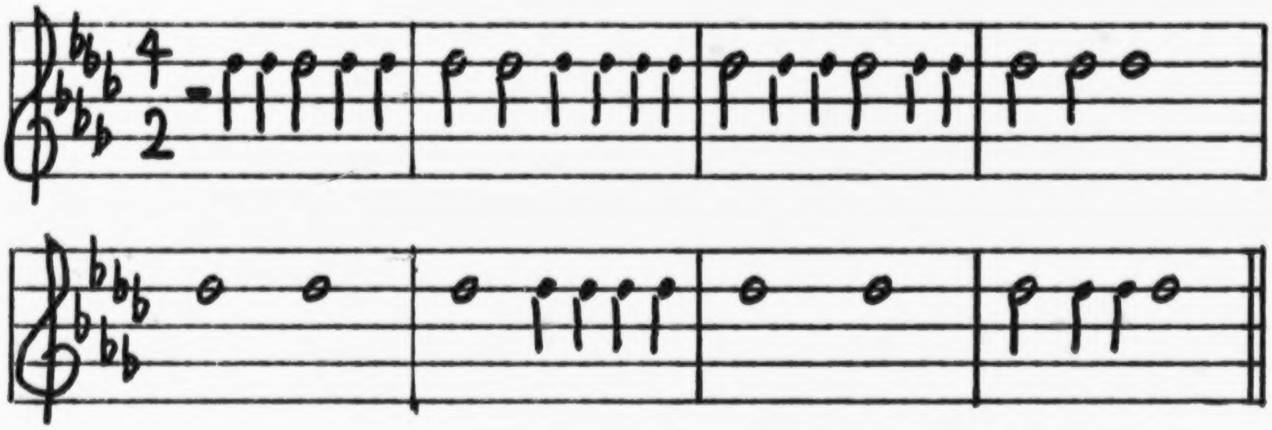


Item 184.

Play D-flat

𝅗𝅥 - 84

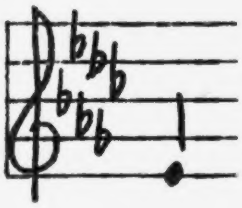


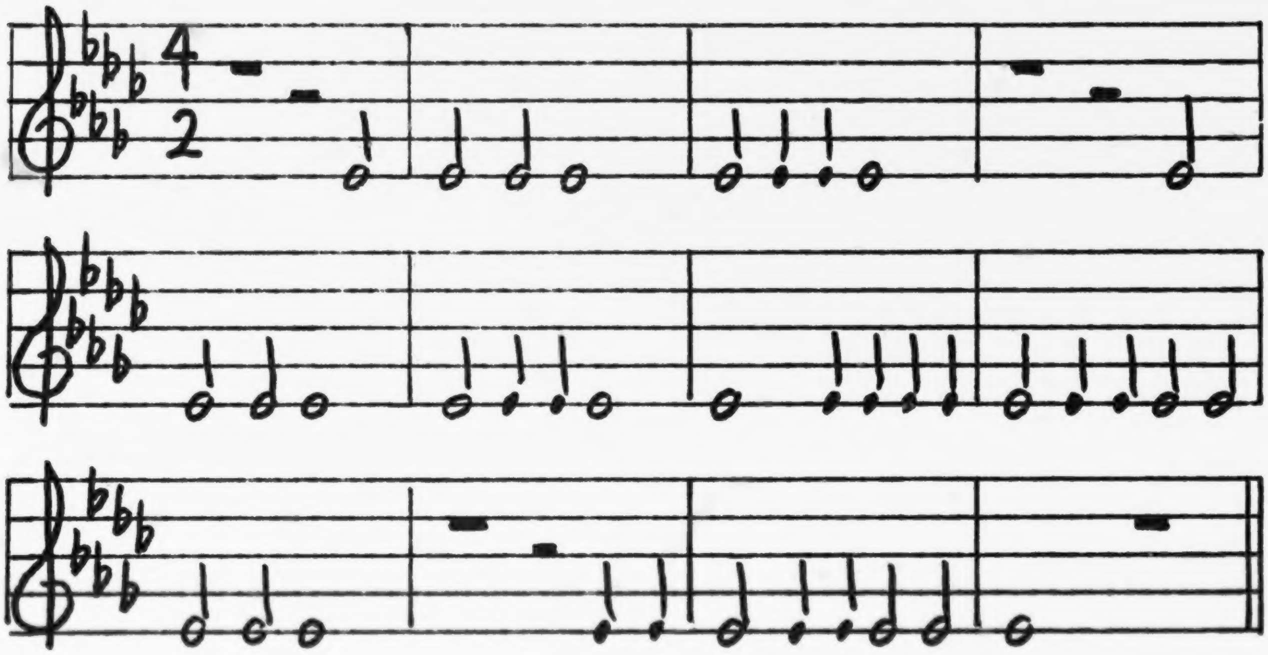


Item 185.

Play E-flat

𝅗𝅥 - 112

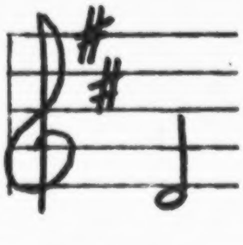


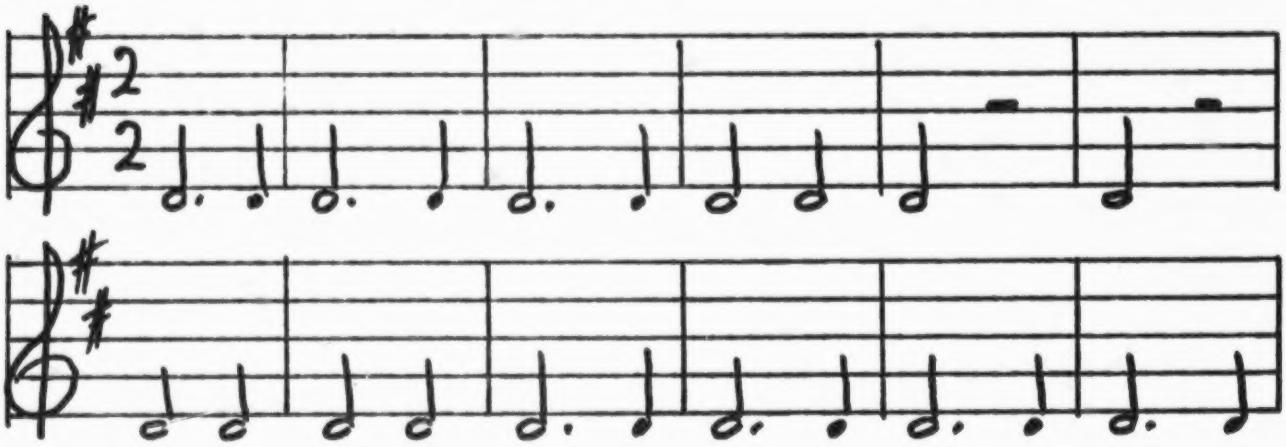


Item 186.

Play D

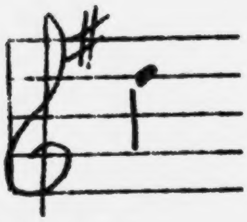
𝅗𝅥 - 60

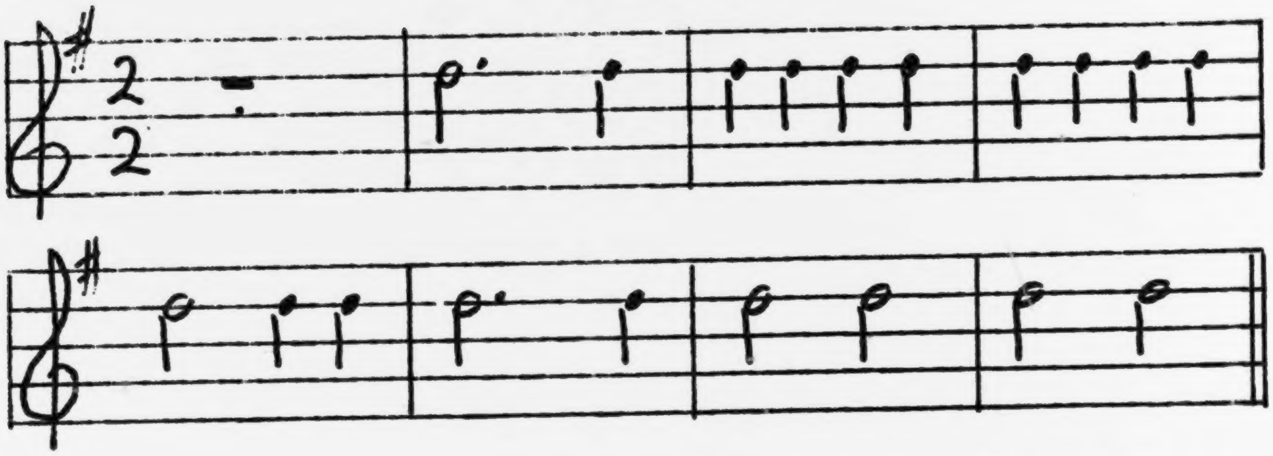




Item 187.

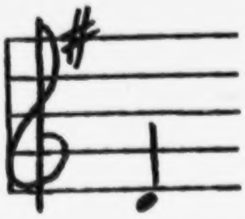
𝅗𝅥 - 112 Play D

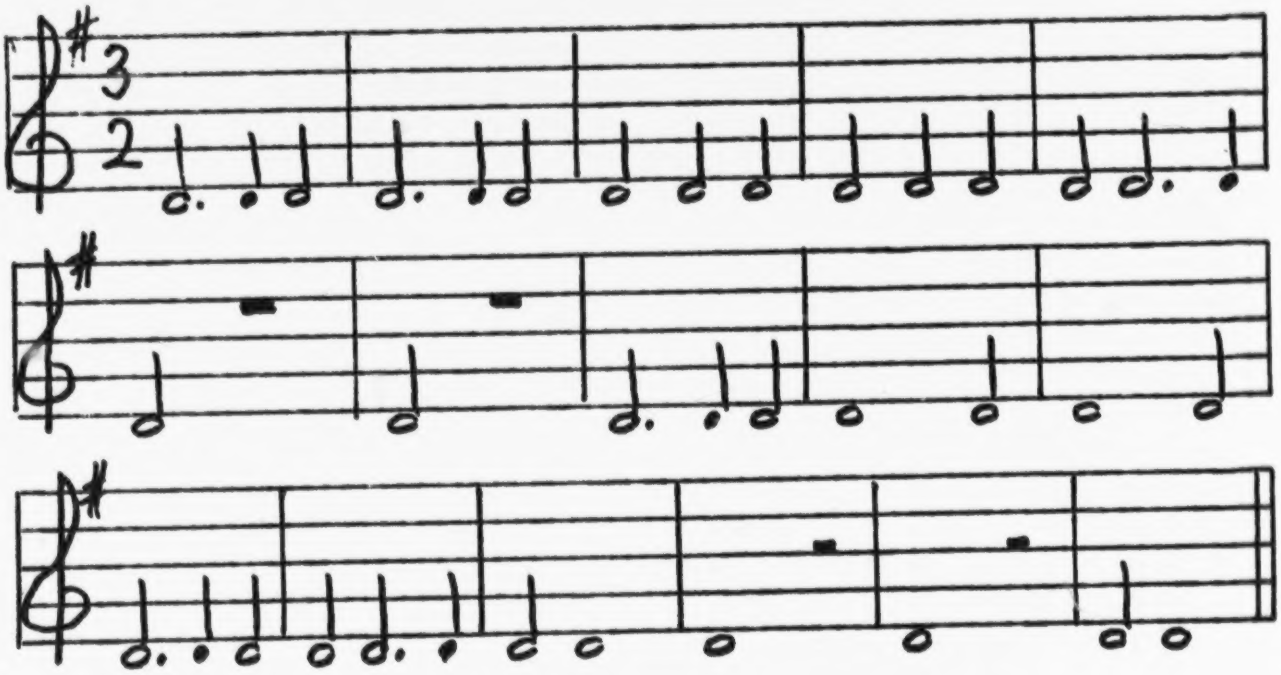




Item 188.

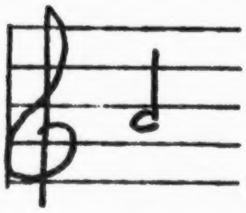
𝅗𝅥 - 108 Play D

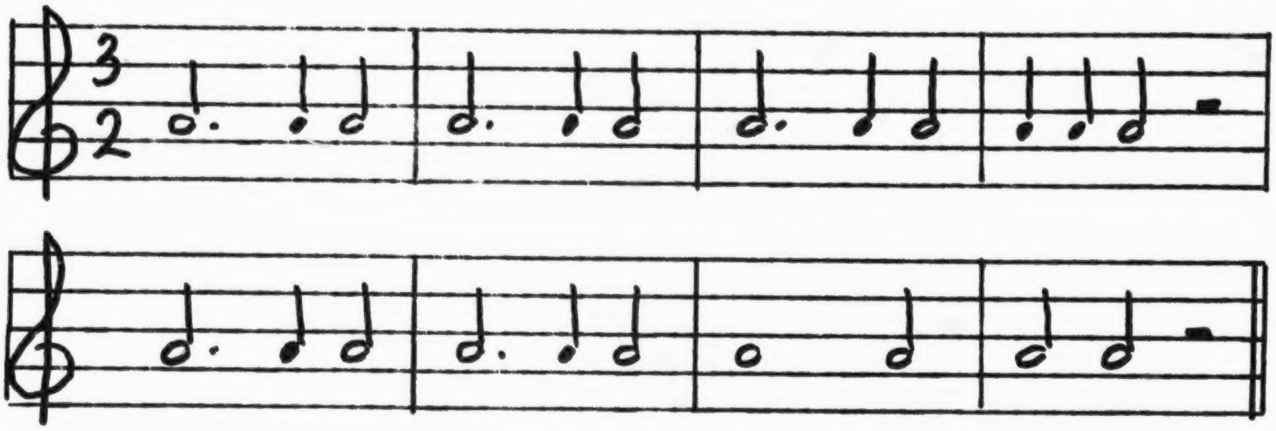




Item 189.

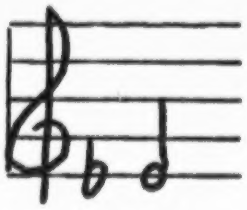
𝅗𝅥 - 96 Play A

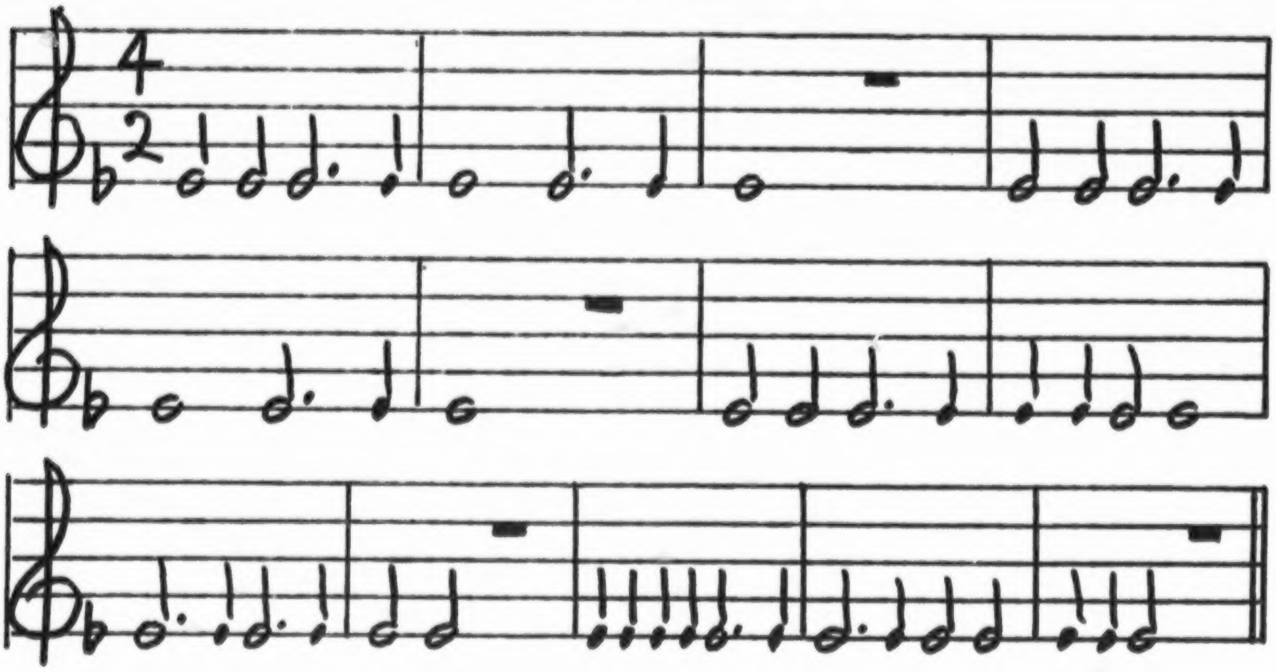




Item 190.

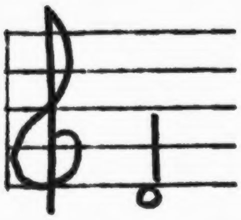
𝅗𝅥 - 63 Play E-flat

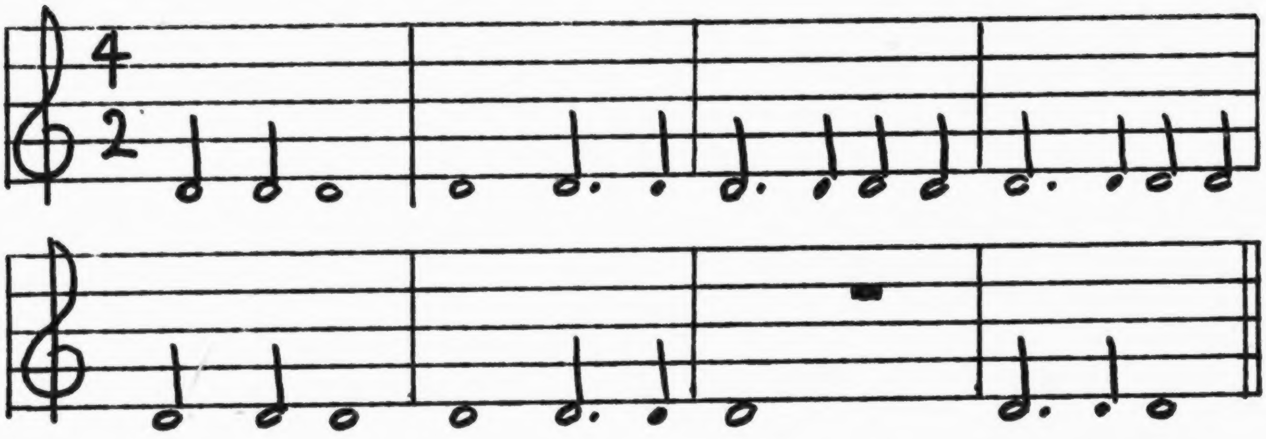




Item 191.

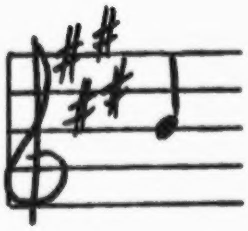
𝅗𝅥 - 120 Play D

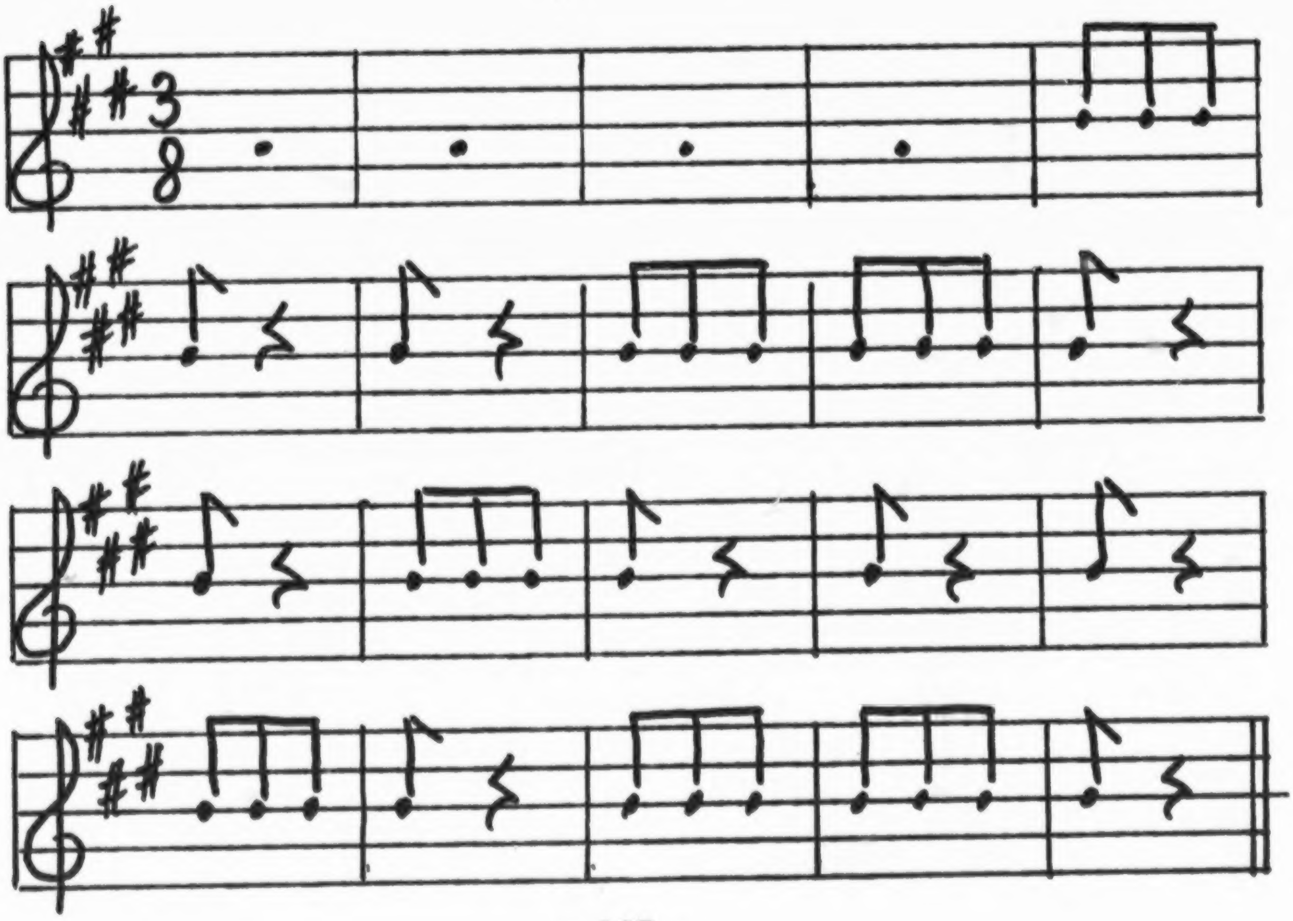




Item 192.

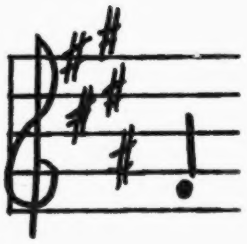
♩. - 58 play B

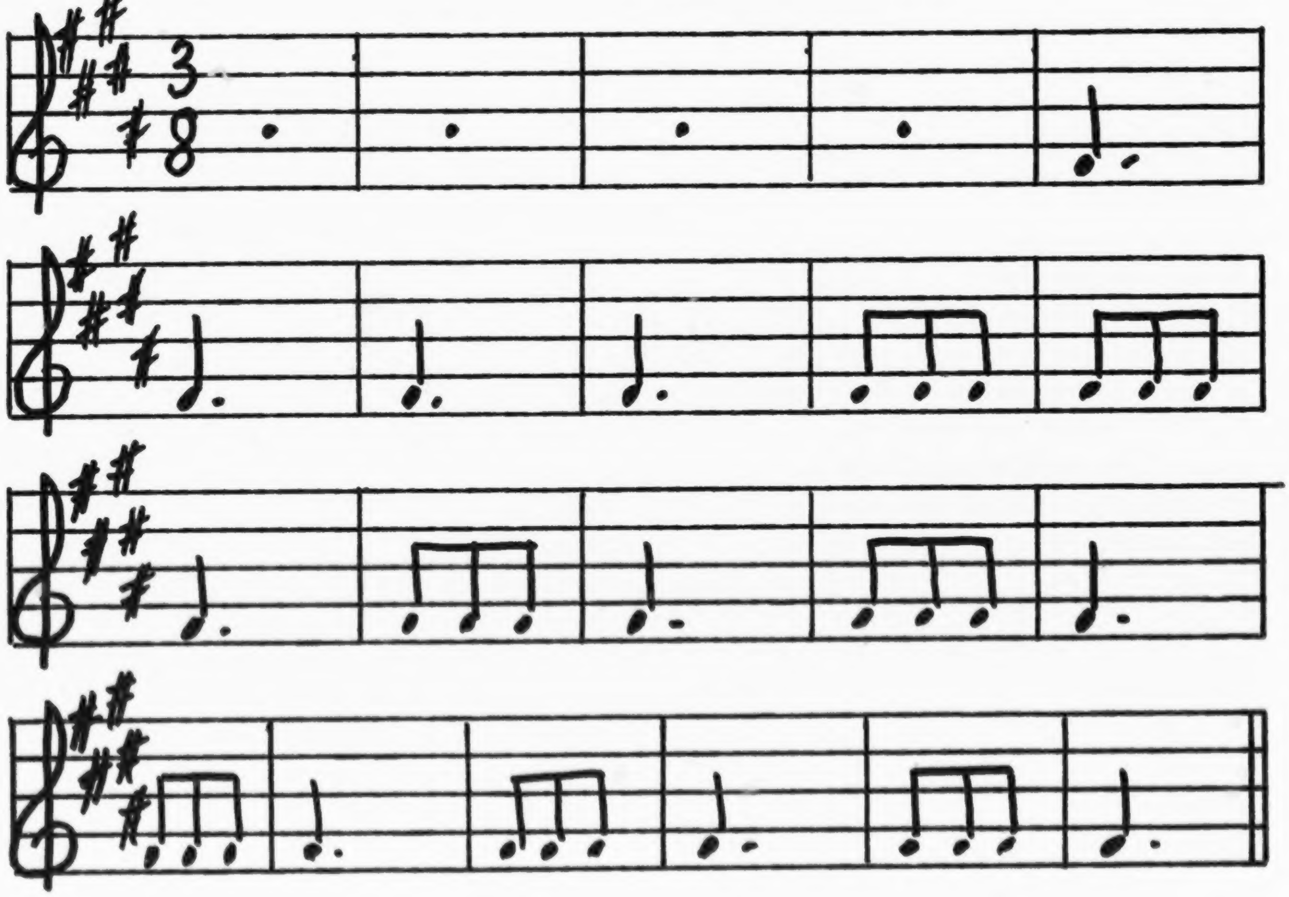




Item 193.

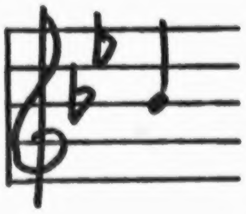
♩. - 58 Play F-sharp

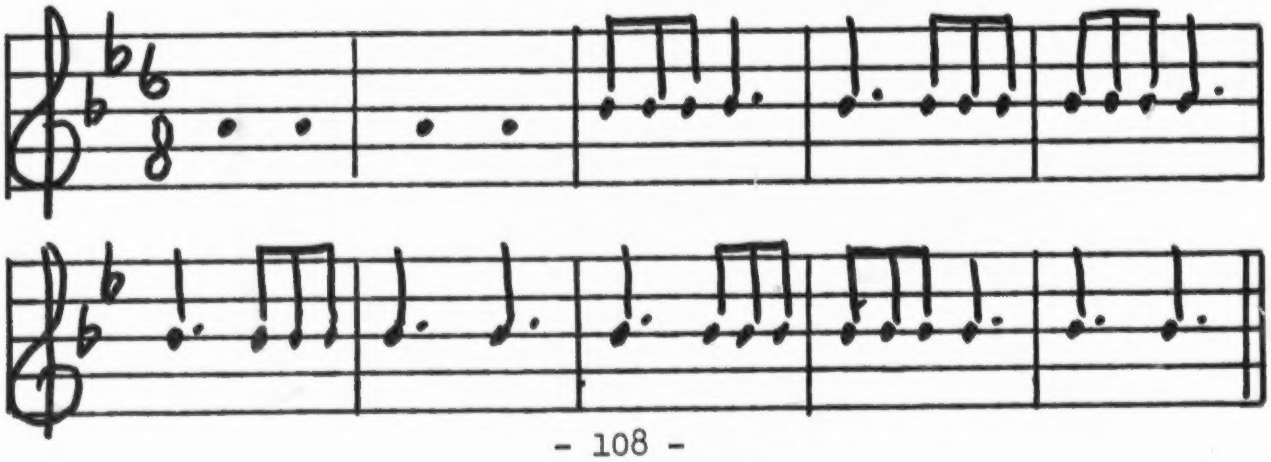




Item 194.

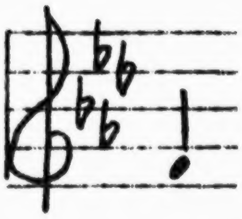
♪. - 76 Play B-flat

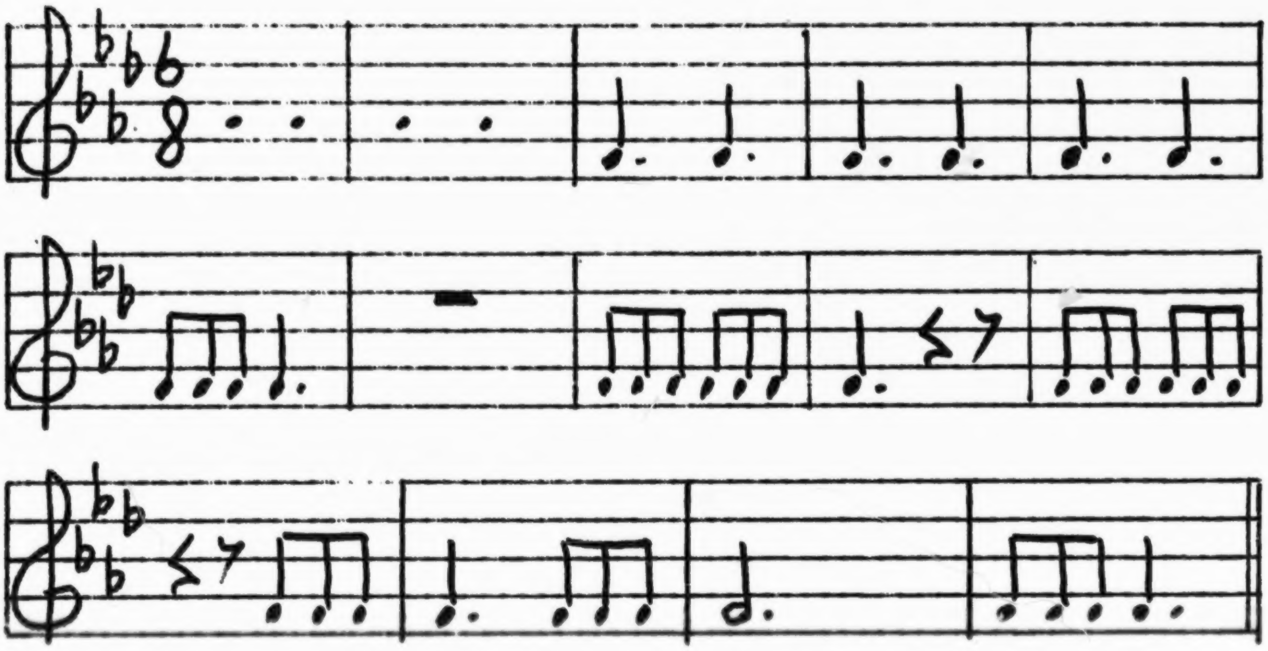




Item 195.

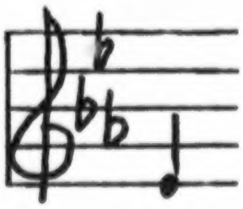
♩. - 84 Play F

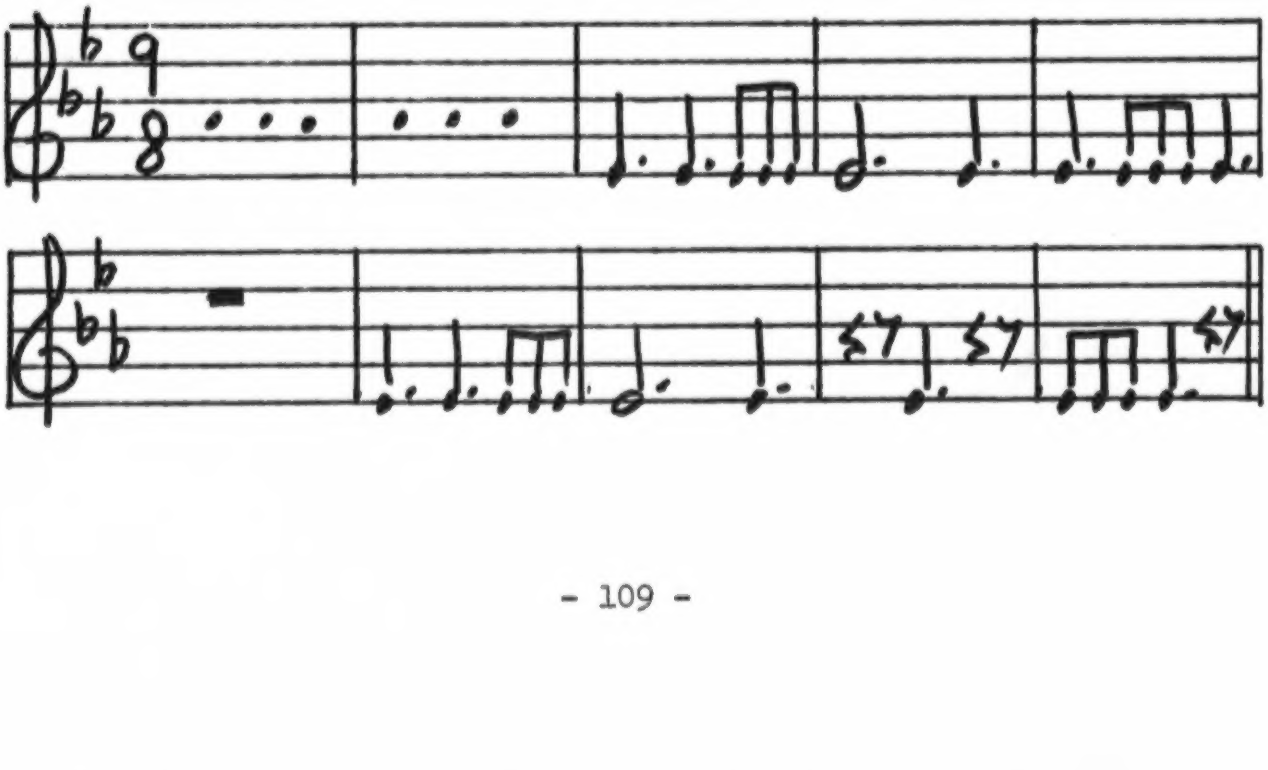




Item 196. Three dotted-quarter units, each containing three eighths.

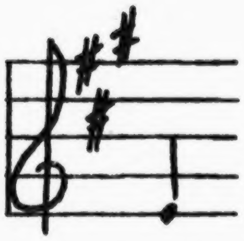
♩. - 76 Play E-flat

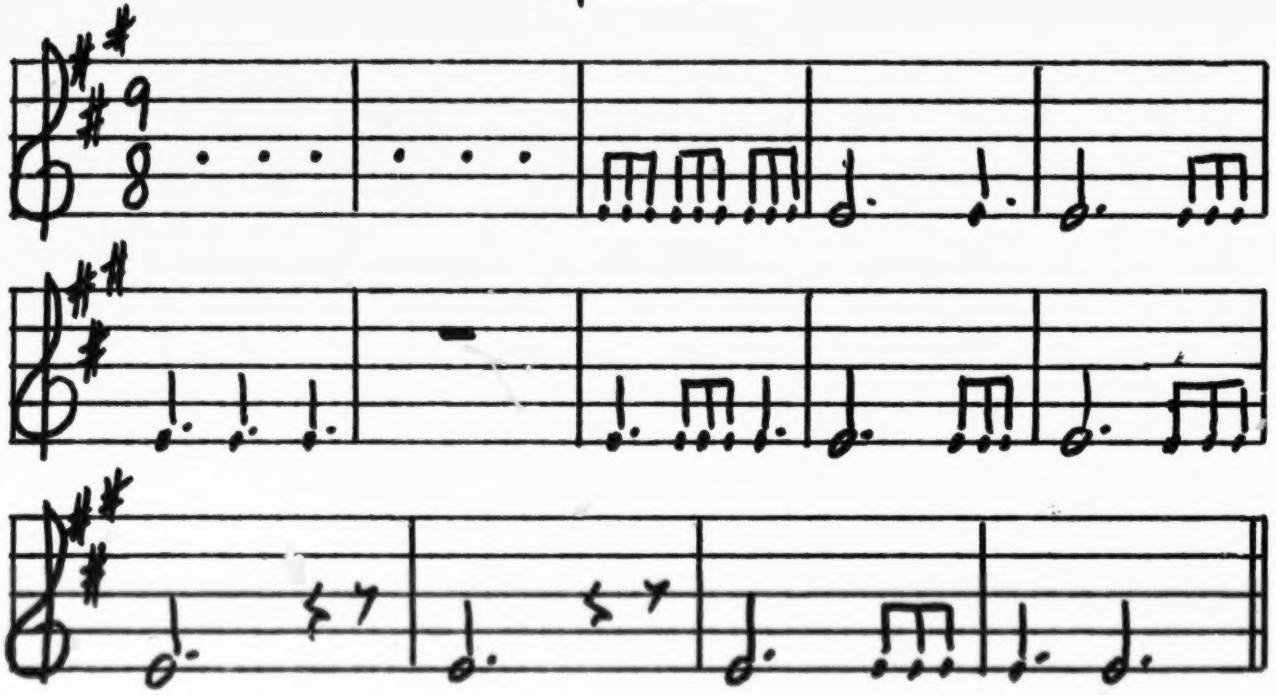




__Item__ __197__.

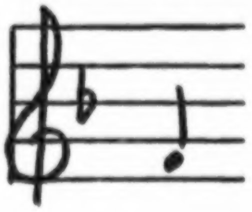
♩. - 72 Play E

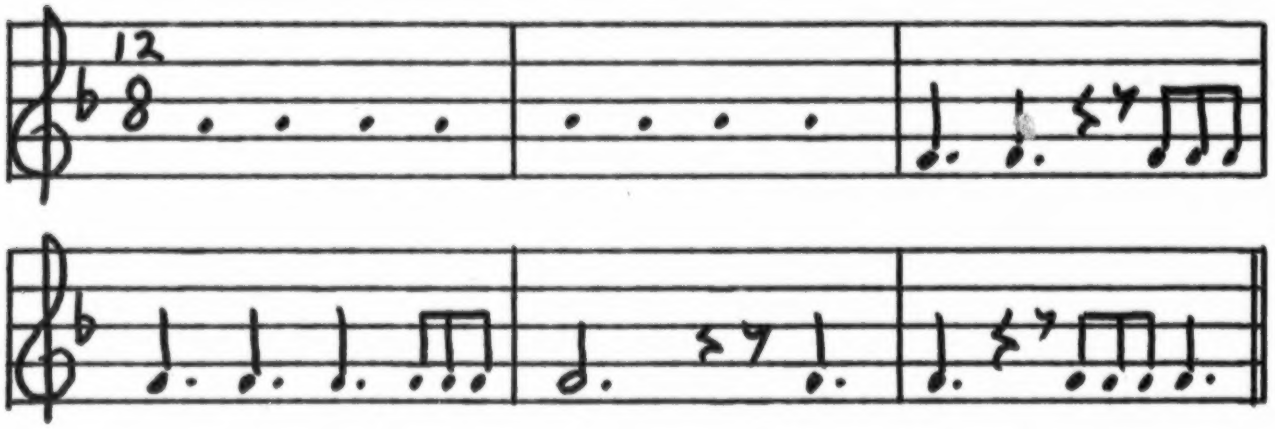




__Item__ __198__.

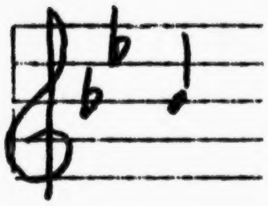
♩. - 72 Play F

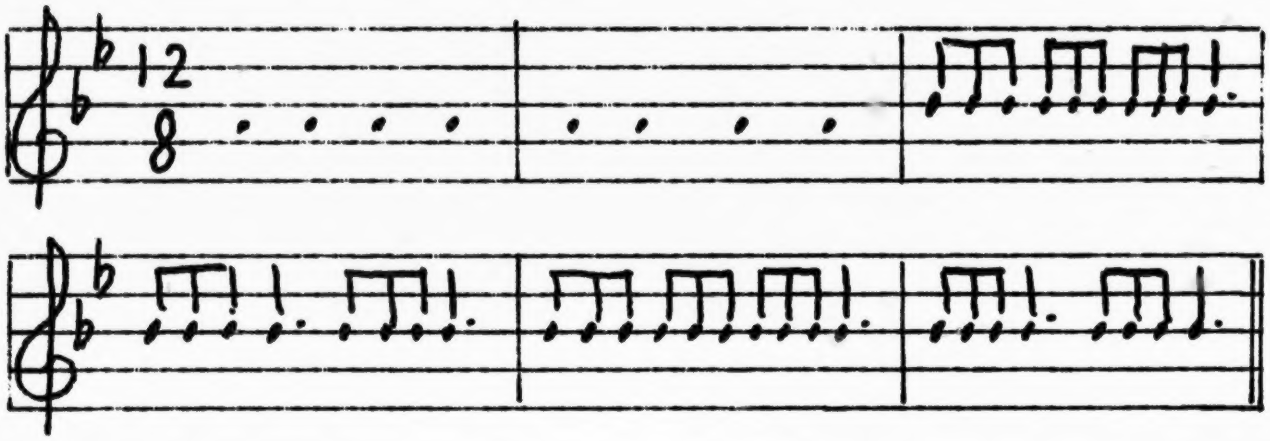




Item 199

♪. - 72 Play B-flat





REVIEW

Equal Divisions

Introducing Harmonic Movement

The material will be presented in paired items. The first item will be a repetition of earlier items, in which you play a rhythm against a melodic background.

There is this difference, however. Since every item has a built-in repetition, the repeat will give you, in addition to the background melody, a second melodic line which outlines the harmonic movement implied by the background melody. You will be aware of this as you respond rhythmically to the background music.

The second item in each pair will indicate that you now are to play the two written notes, one at the beginning of each measure, which will make your rhythmical response very simple. This will allow you to put your entire attention on the two notes to be played.

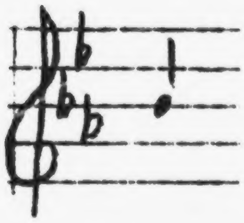
Find the two notes in the same way that you found the single note on the keyboard in earlier items. Place the right hand finger on the higher of the two keys, and the left hand finger on the lower. Then, when you are all set to go, start the machine and respond as indicated.

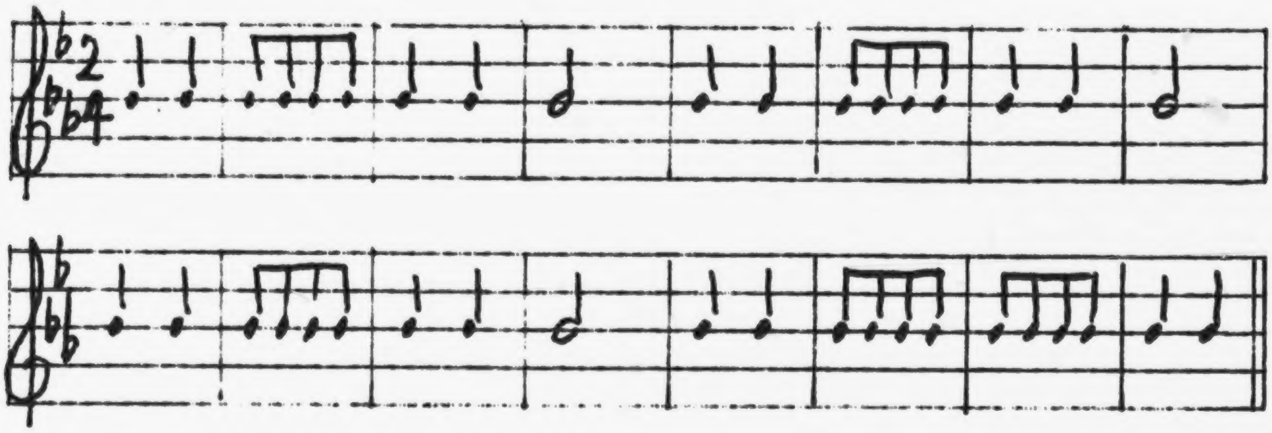
This will show you the pattern of training:

Item 1.	Play rhythm.
(repeat)	Play rhythm and listen to harmonic outline tones.
Item 2.	(using the same material as Item 1) Play the notes as indicated (harmonic outline). Repeat.
Item 3.	New music, etc.

Item 200.

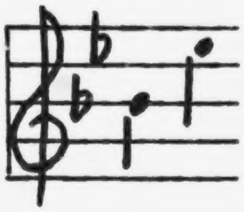
♩ - 100 Play B-flat

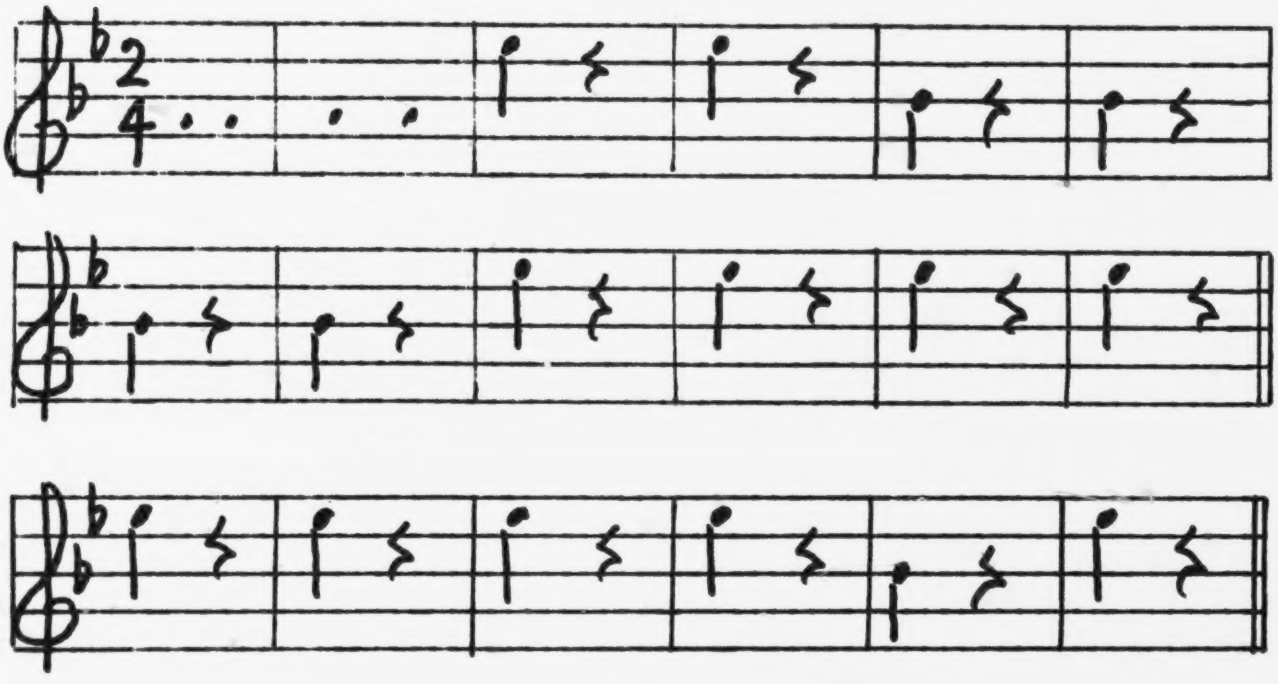




Item 201.

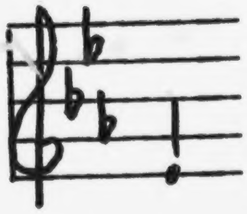
♩ -100 Play B-flat and E-flat

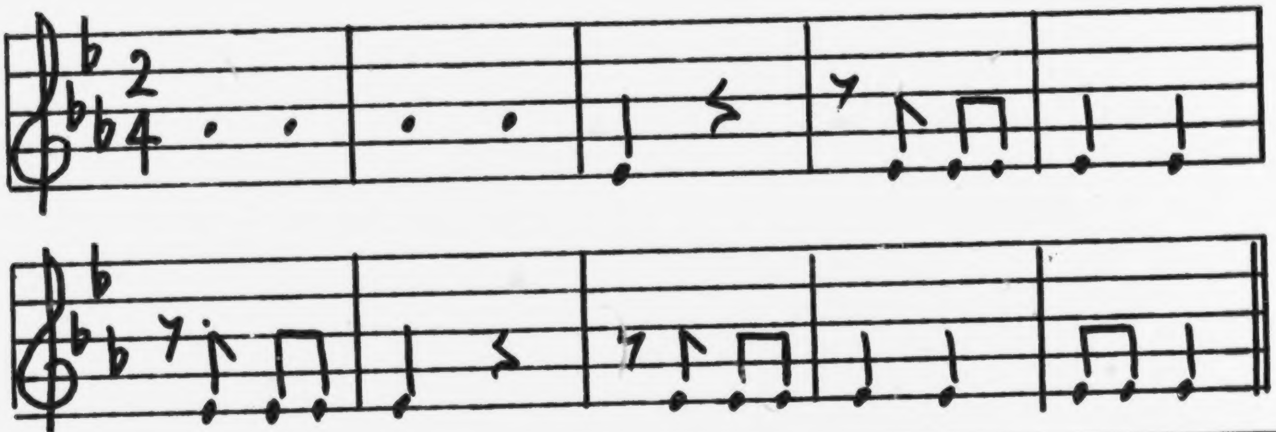




Item 202.

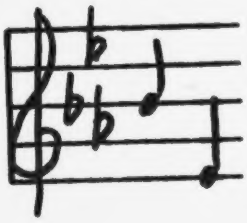
♩ - 80 Play E-flat

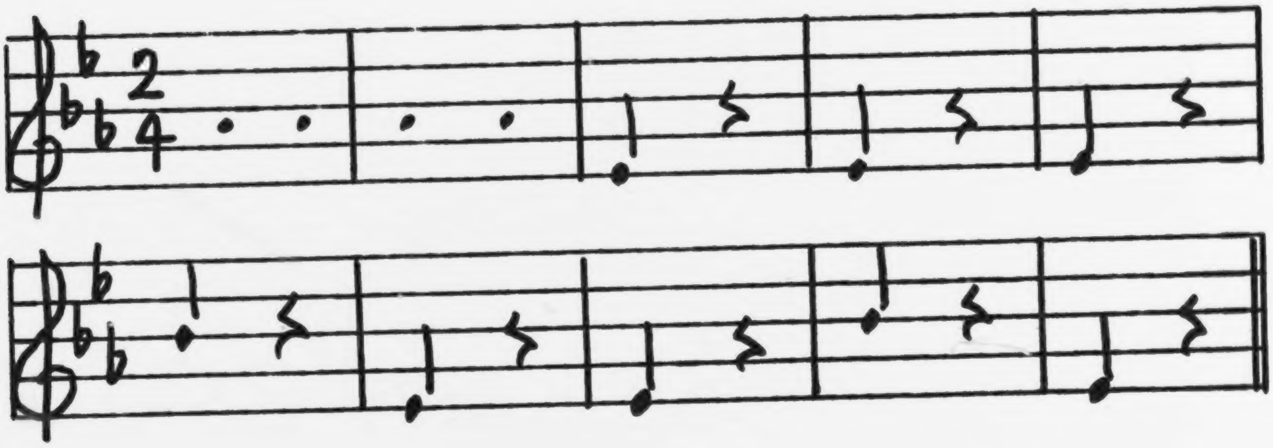




Item 203.

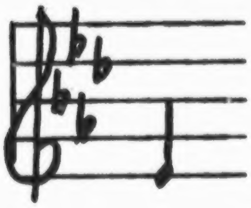
♩ - 80 Play B-flat and E-flat

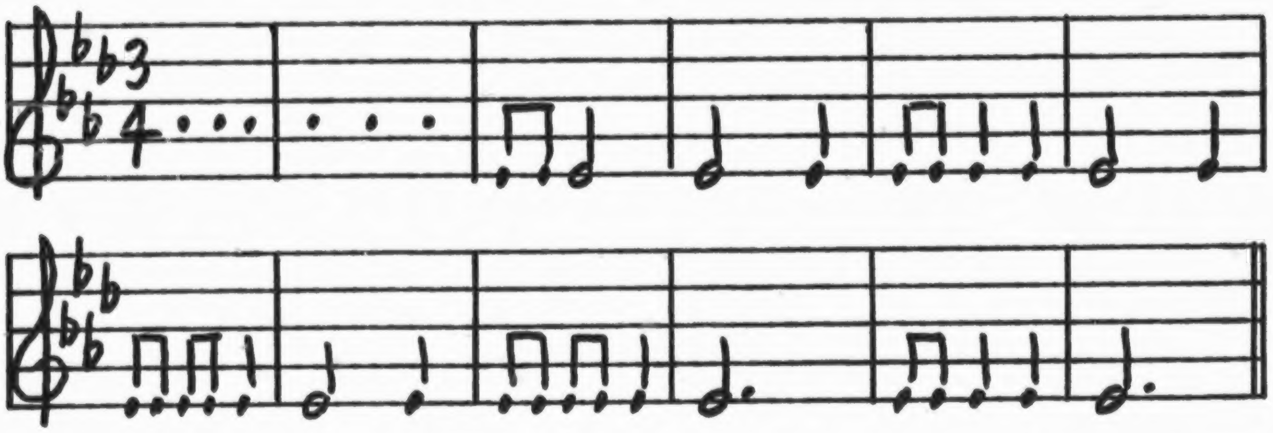




Item 204.

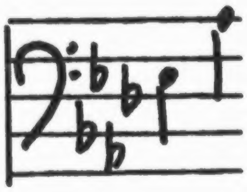
♩ - 104 Play E-flat

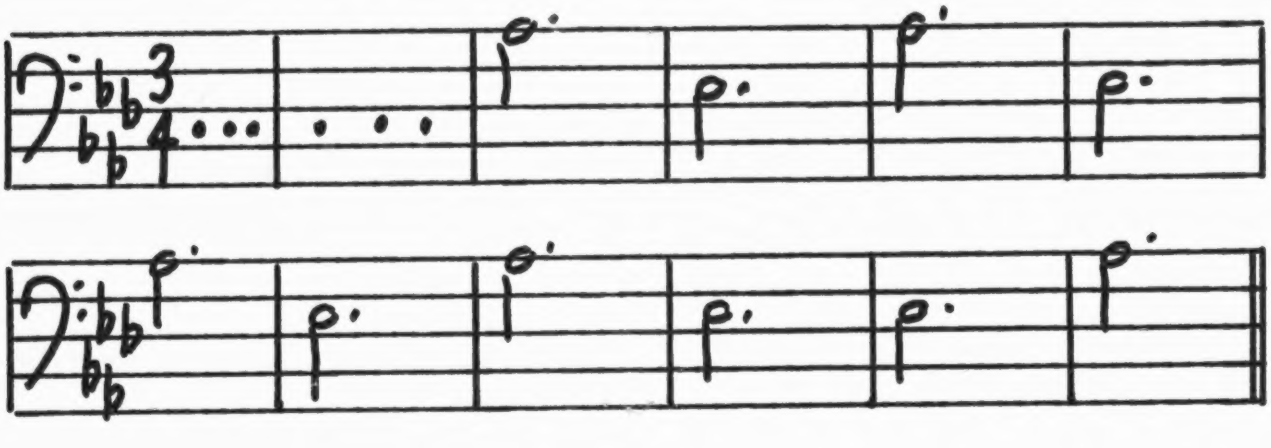




Item 205.

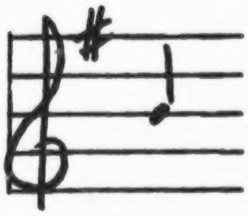
♩ - 104 Play E-flat and A-flat

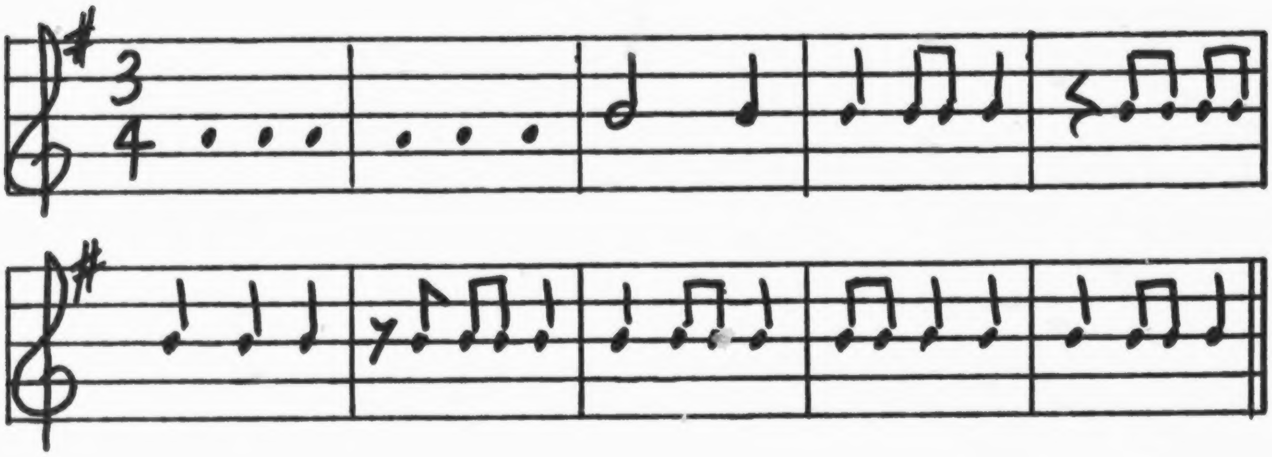




Item 206.

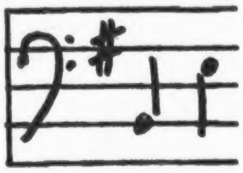
♩ - 104 Play B

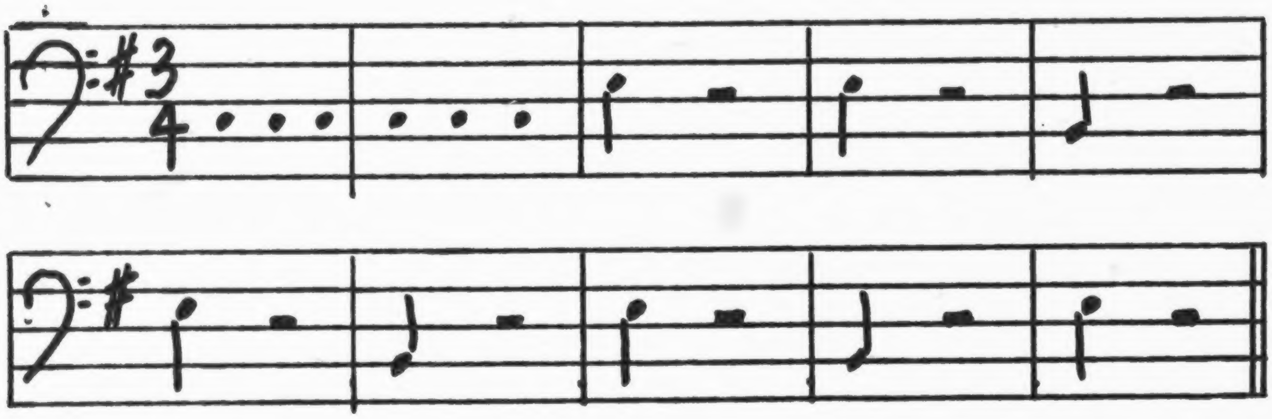




Item 207.

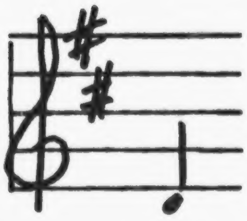
♩. - 104 Play B and E

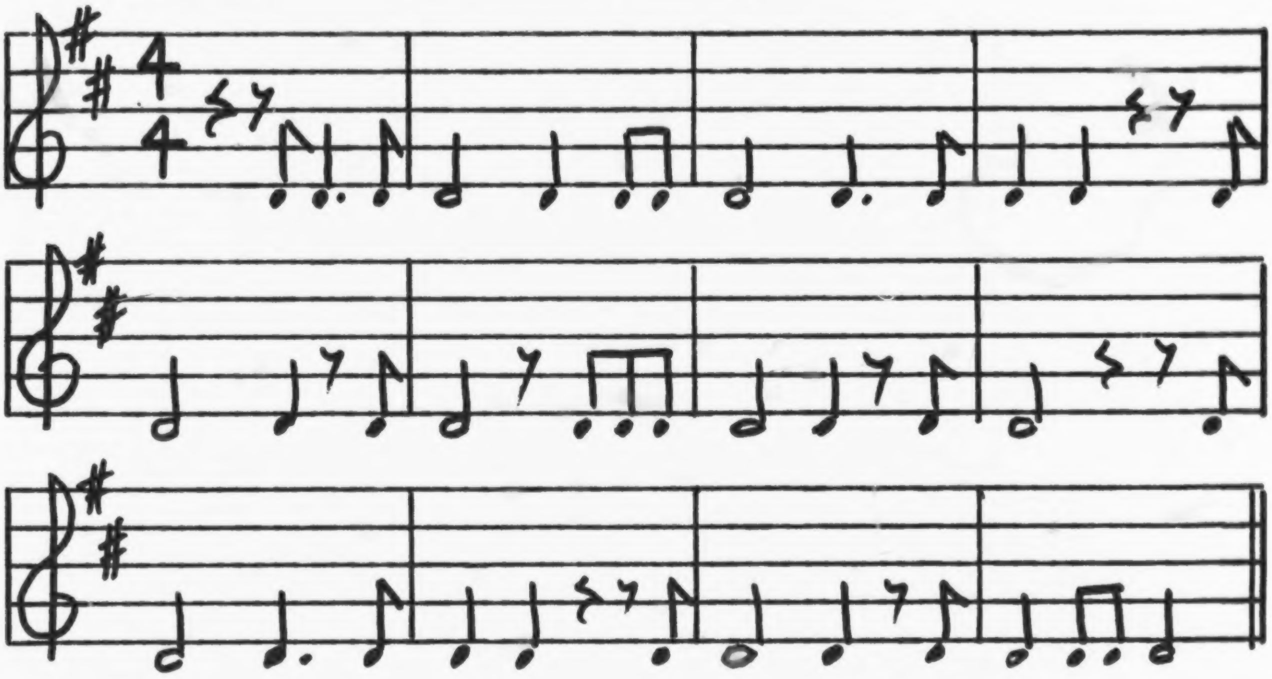




Item 208.

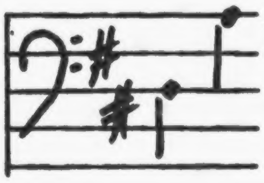
♩ - 60 Play D

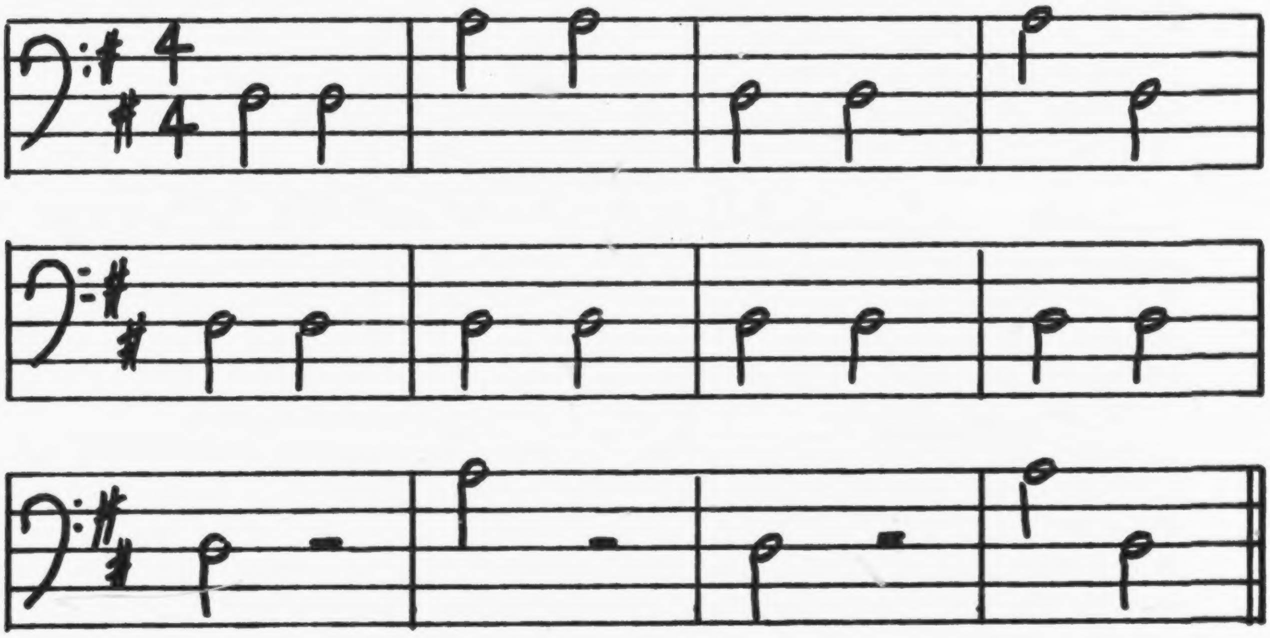




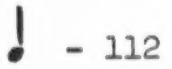
Item 209.

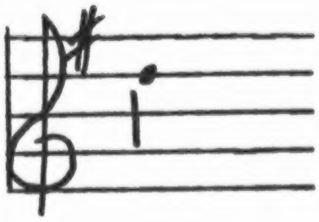
♩ - 60 Play D and A

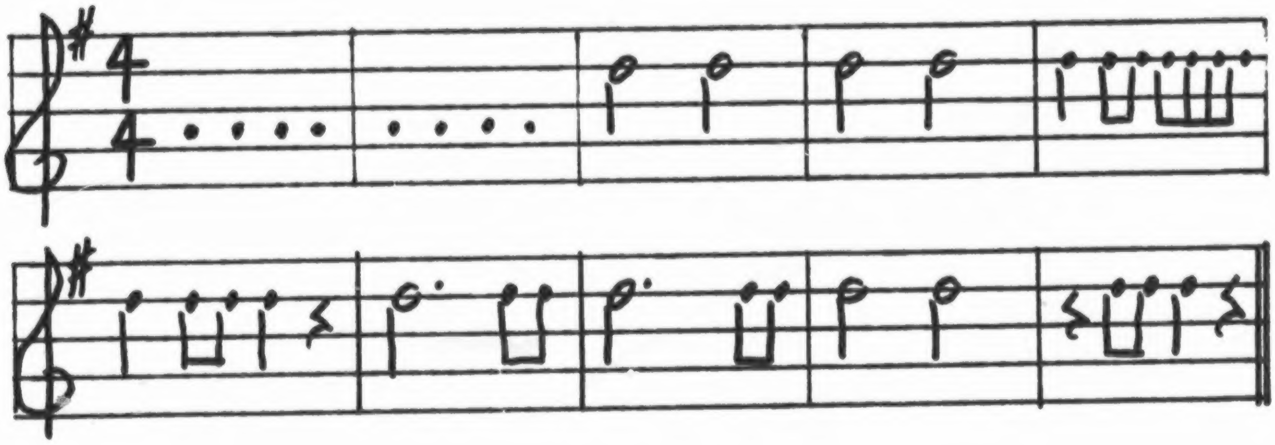




Item 210.

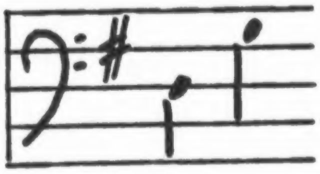

- 112 Play D

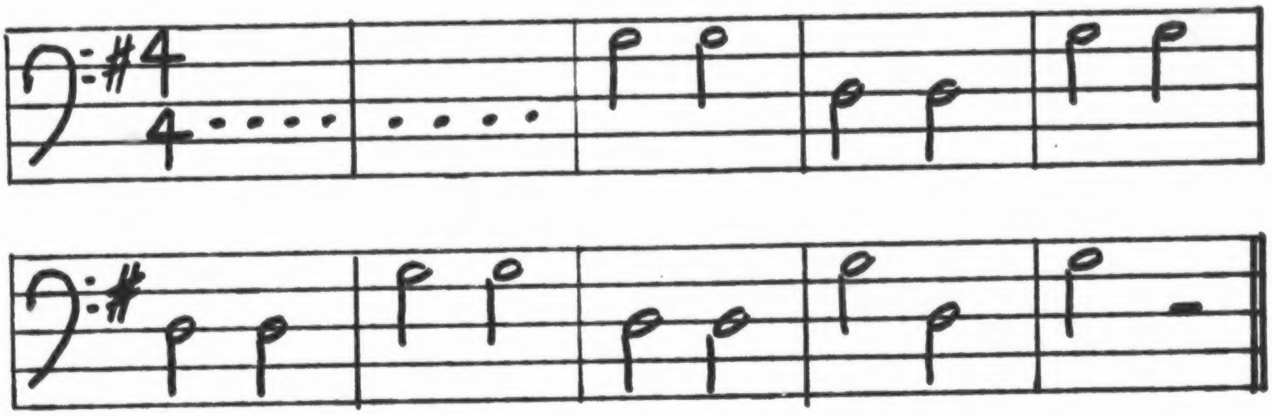




Item 211.

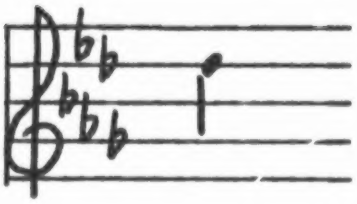
- 112 Play D and G

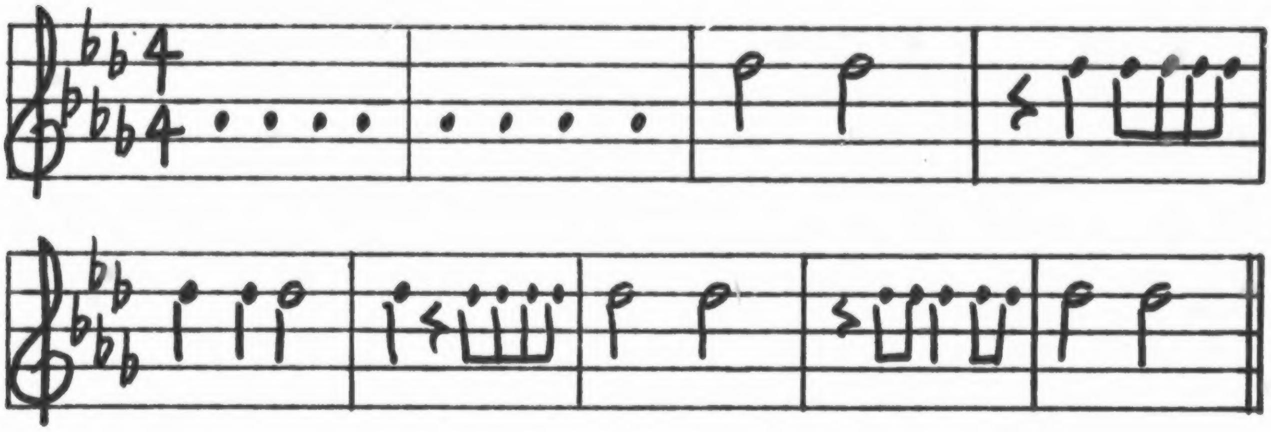




Item 212.

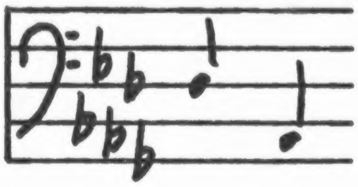
♩ - 84 Play D-flat

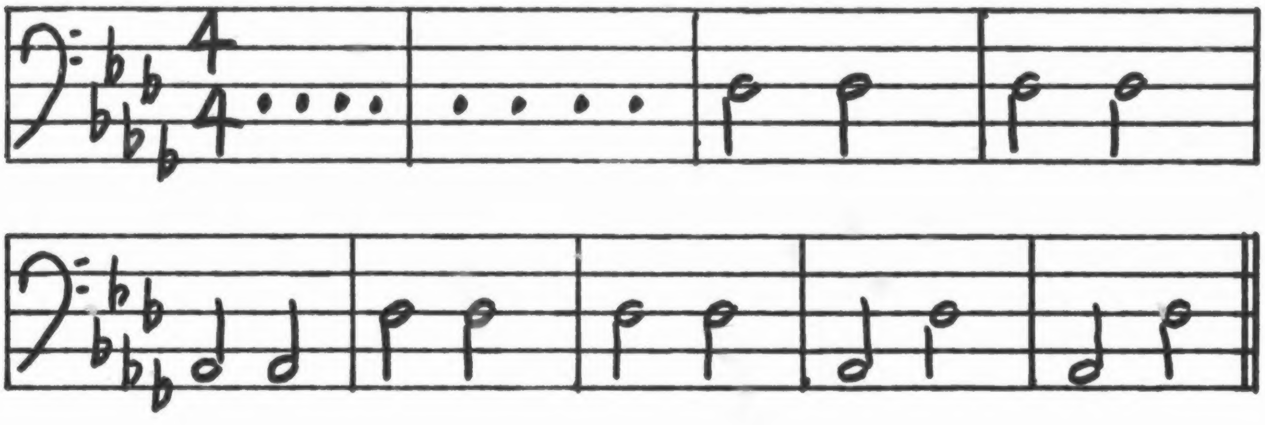




Item 213.

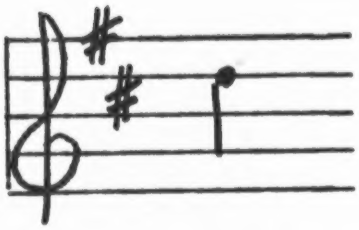
♩ - 84 Play D-flat and A-flat

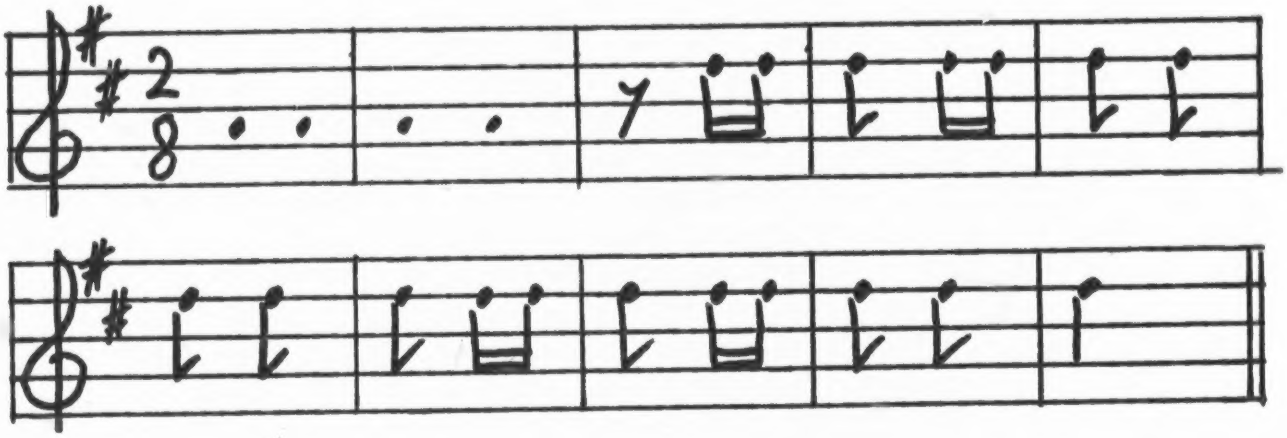




Item 214.

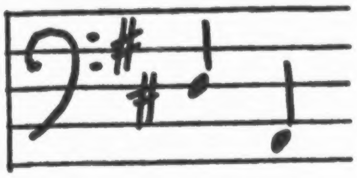
♪ - 112 Play D

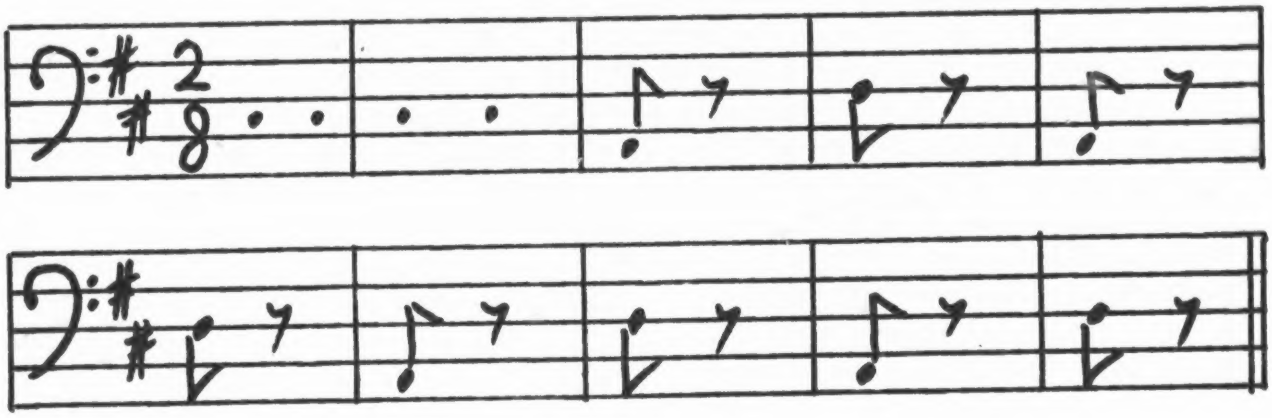




Item 215.

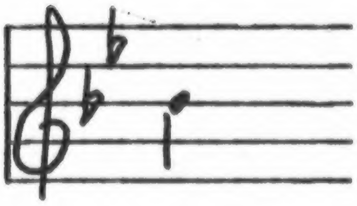
♪ - 112 Play D and A

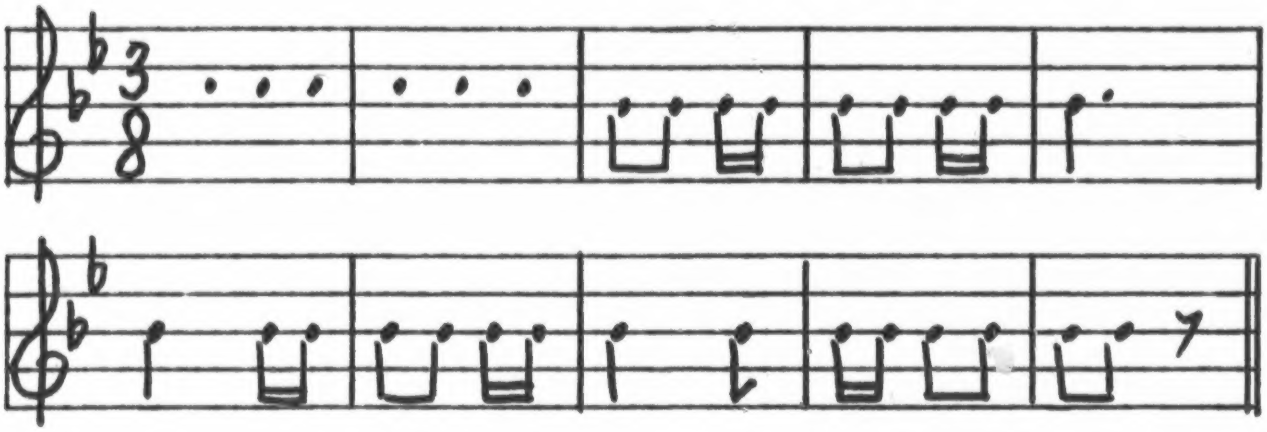




Item 216.

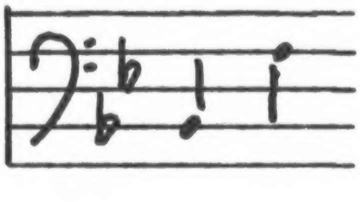
♪ - 112 Play B-flat

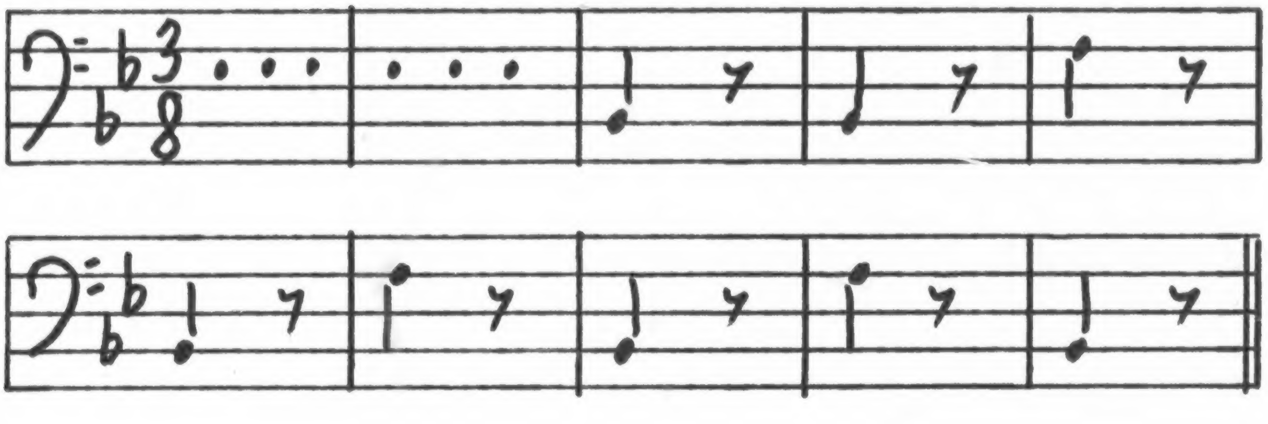




Item 217.

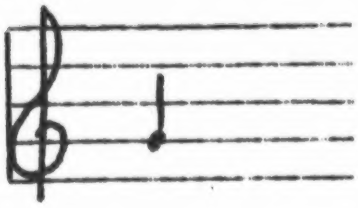
♪ - 112 Play B-flat and F

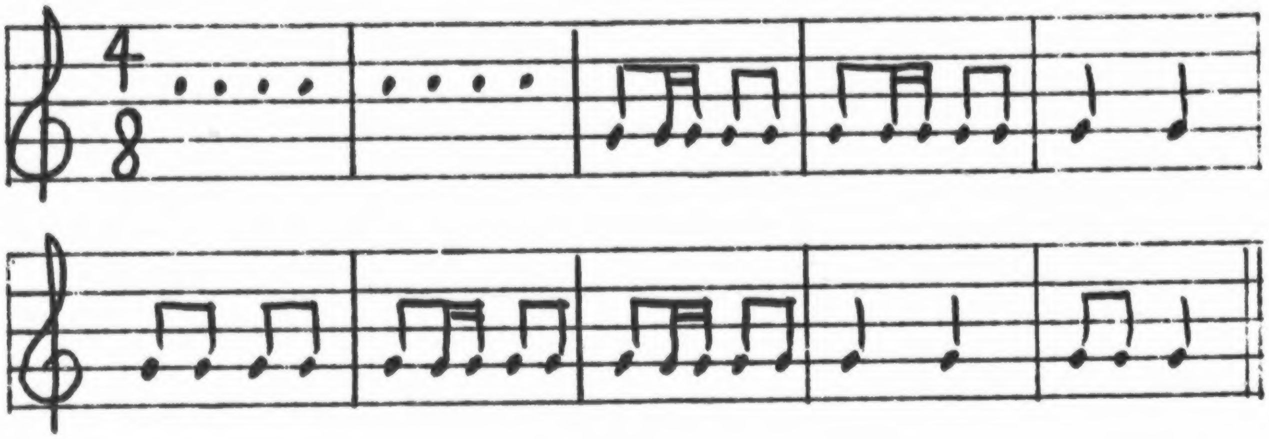




Item 218.

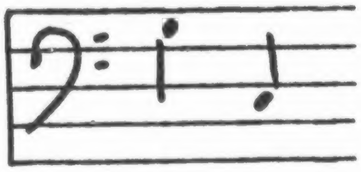
♪ - 116 Play G

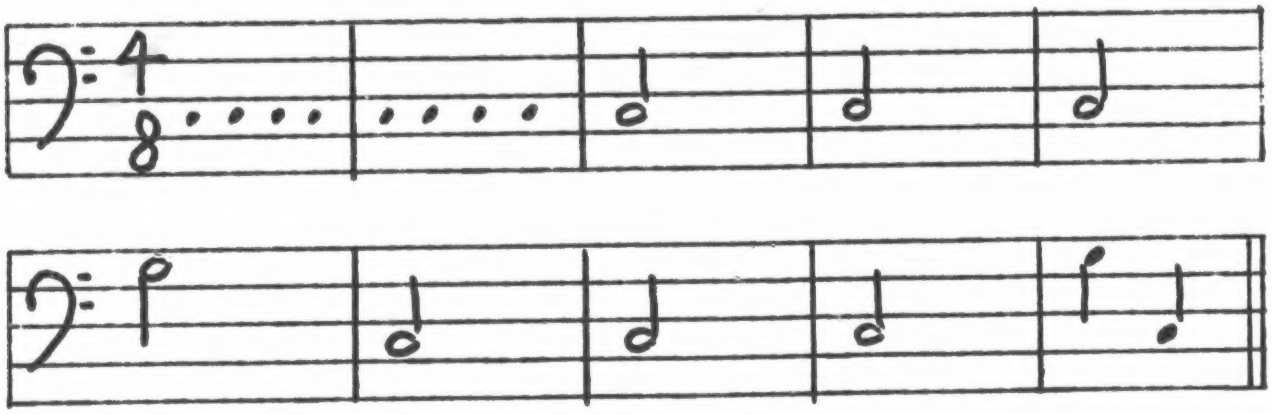




Item 219.

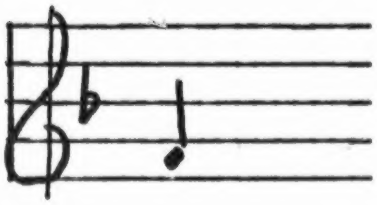
♪ - 116 Play G and C

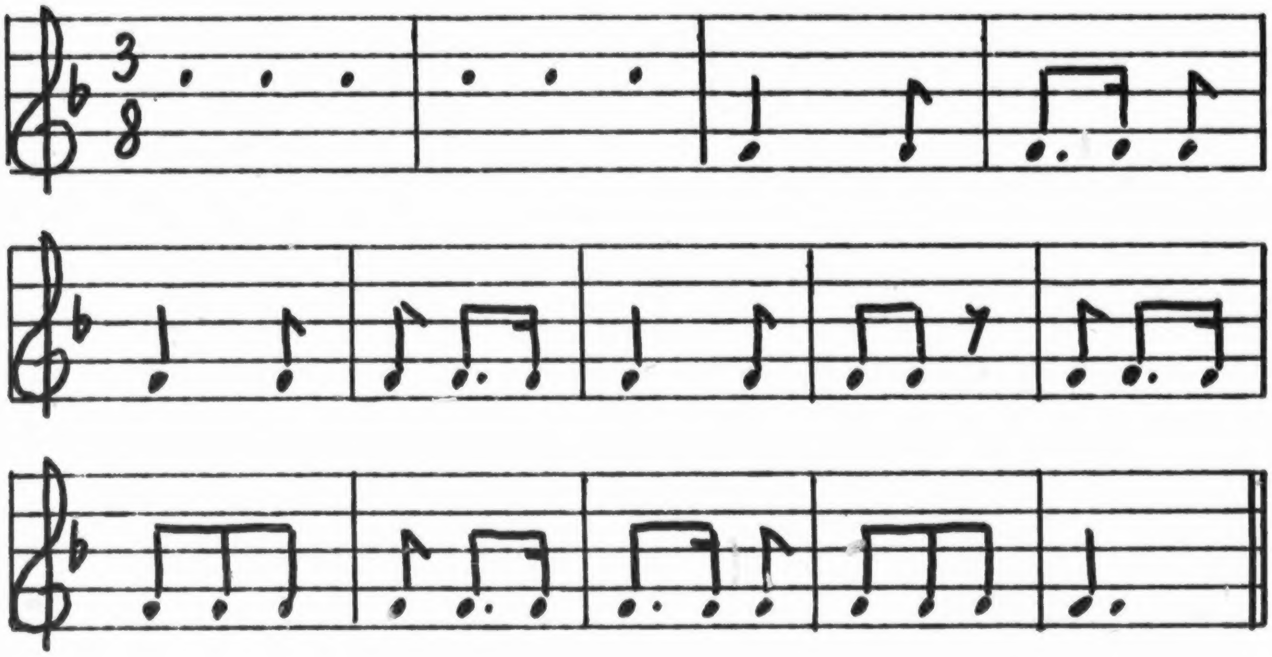




Item 220.

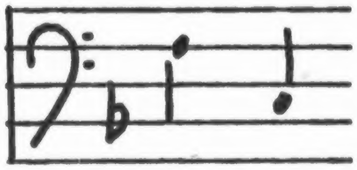
♪ - 100 Play F

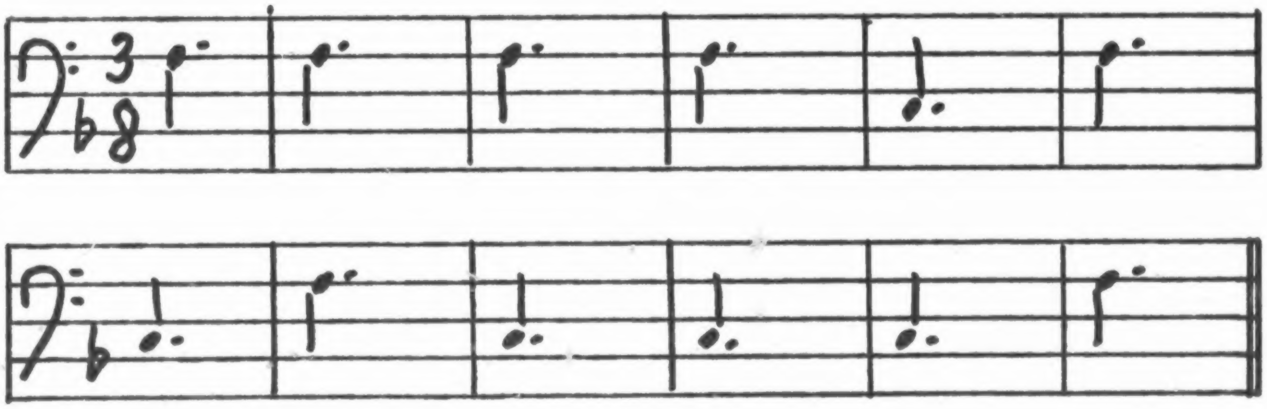




Item 221.

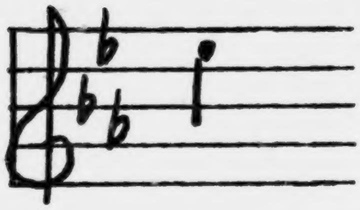
♪ - 100 Play F and C

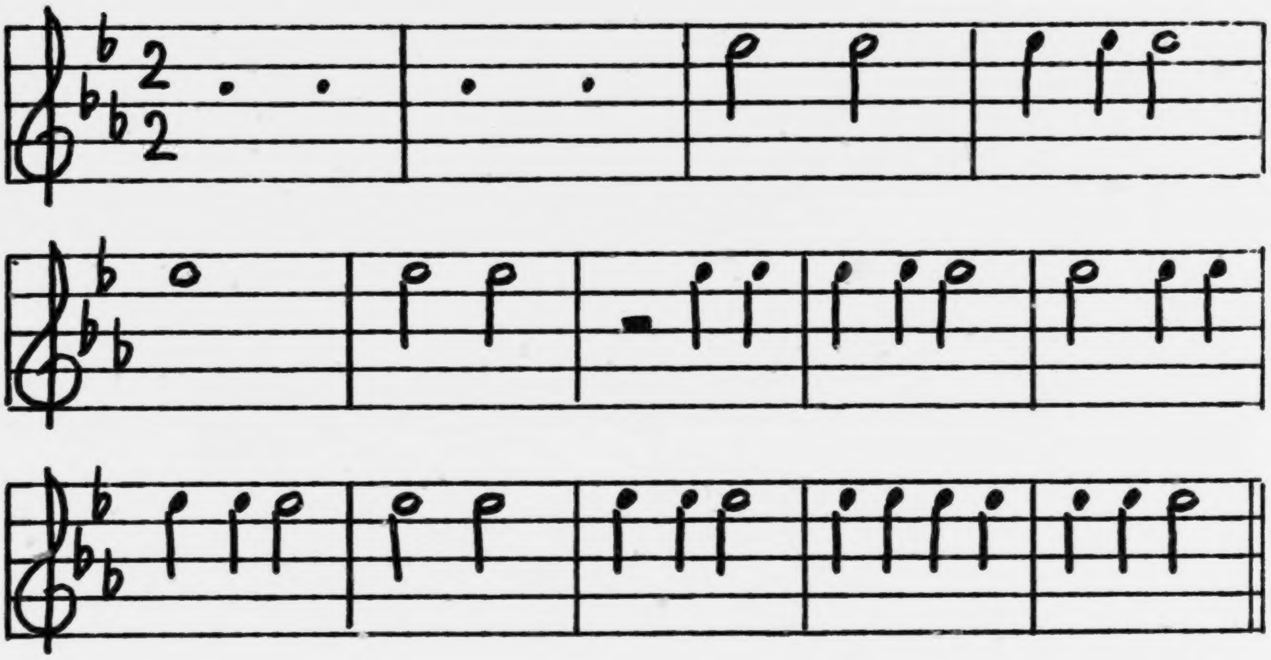




Item 222.

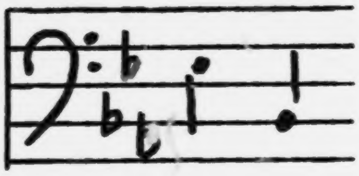
𝅗𝅥 - 76 Play E-flat

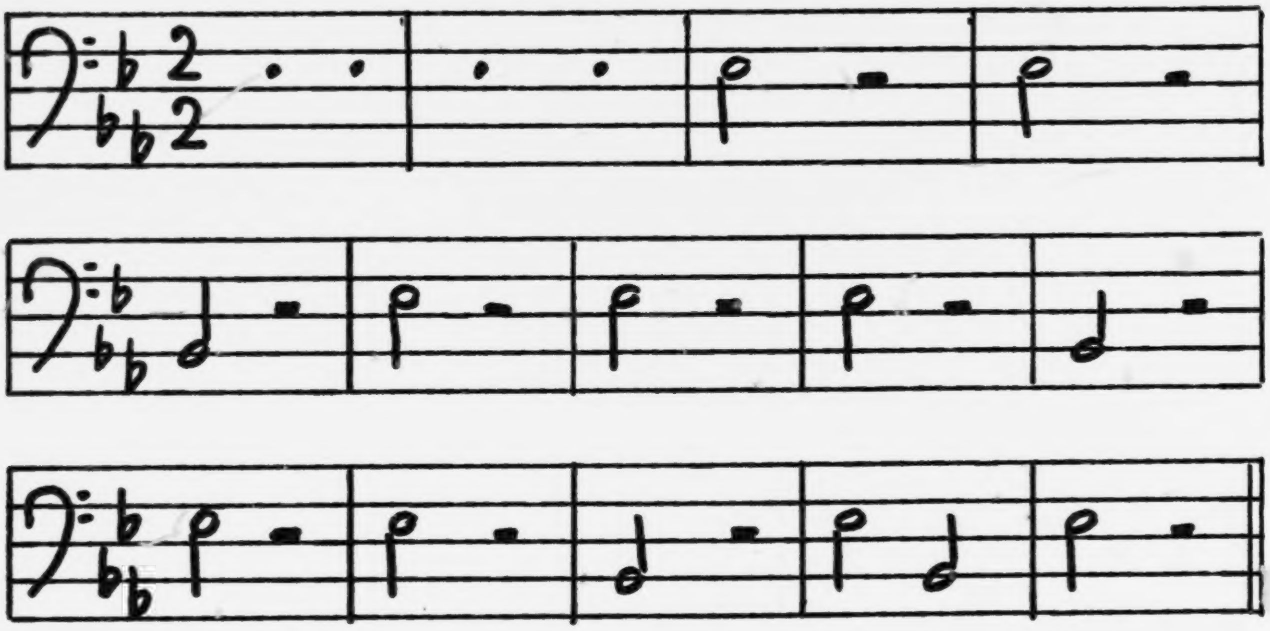




Item 223.

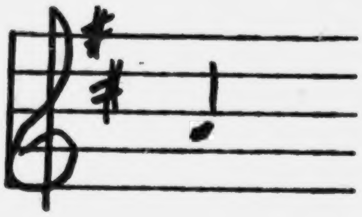
𝅗𝅥 - 76 Play E-flat and B-flat

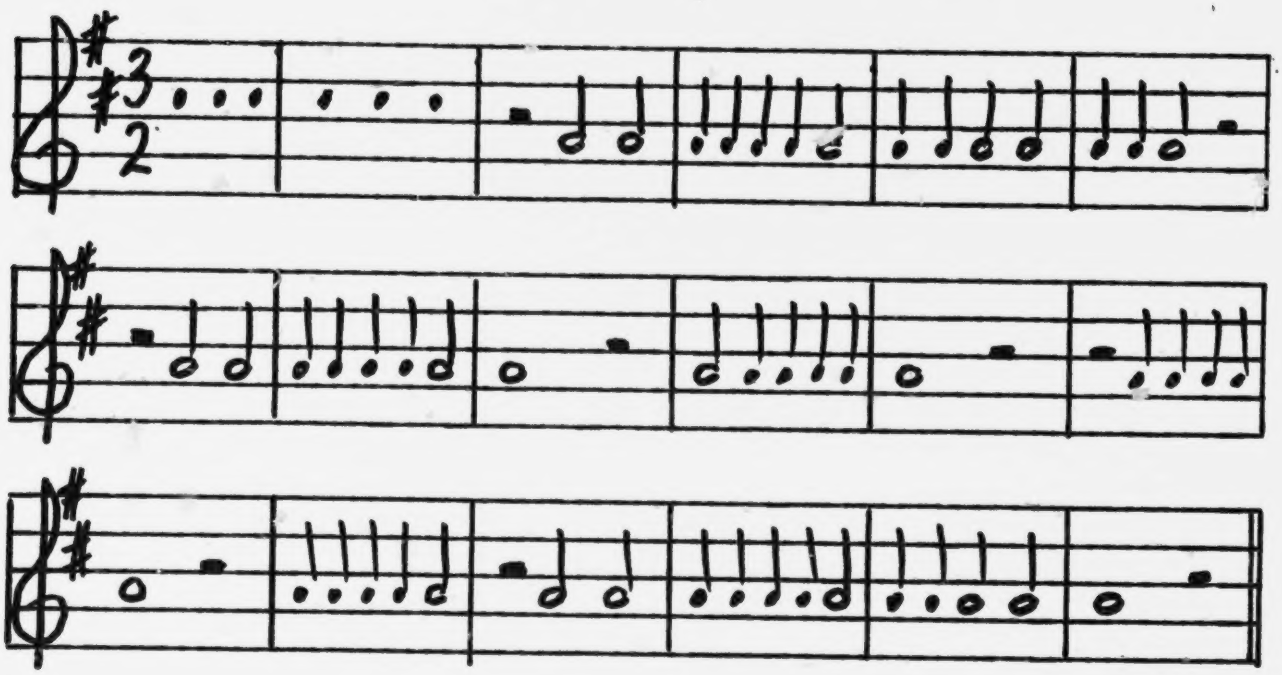




Item 224.

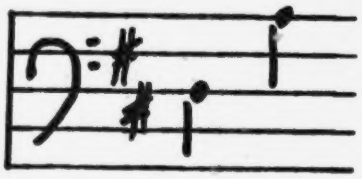
𝅗𝅥 - 100 Play A

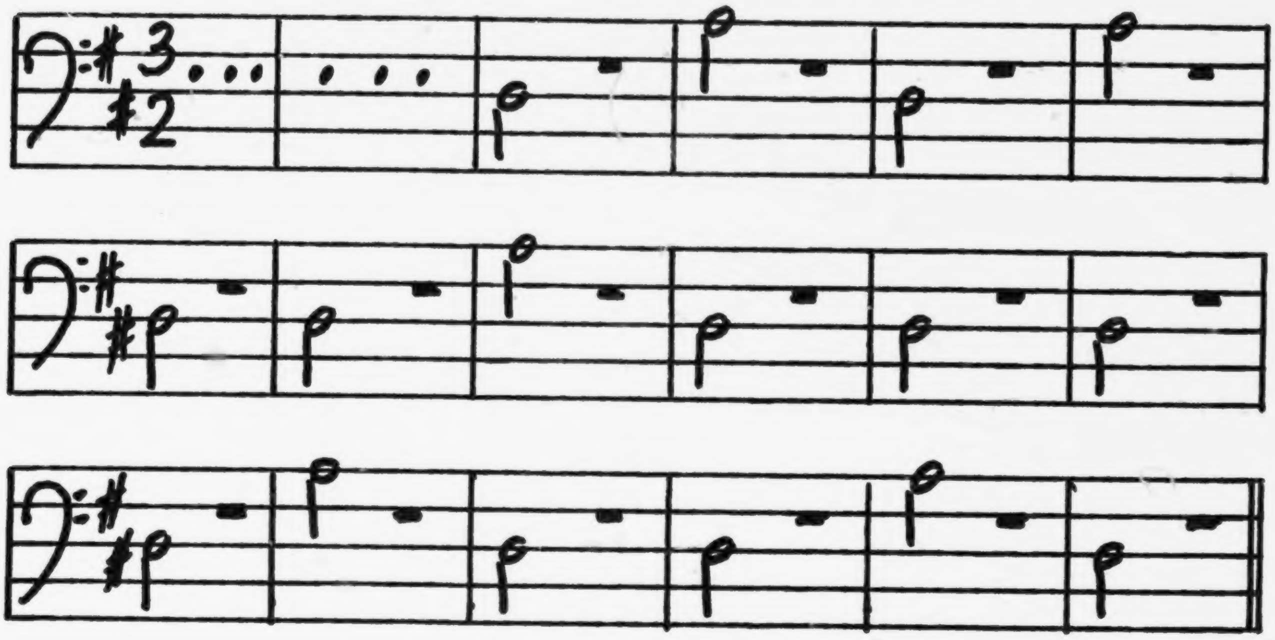




Item 225.

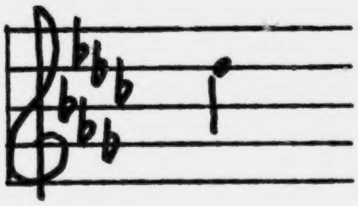
𝅗𝅥 - 100 Play D and A

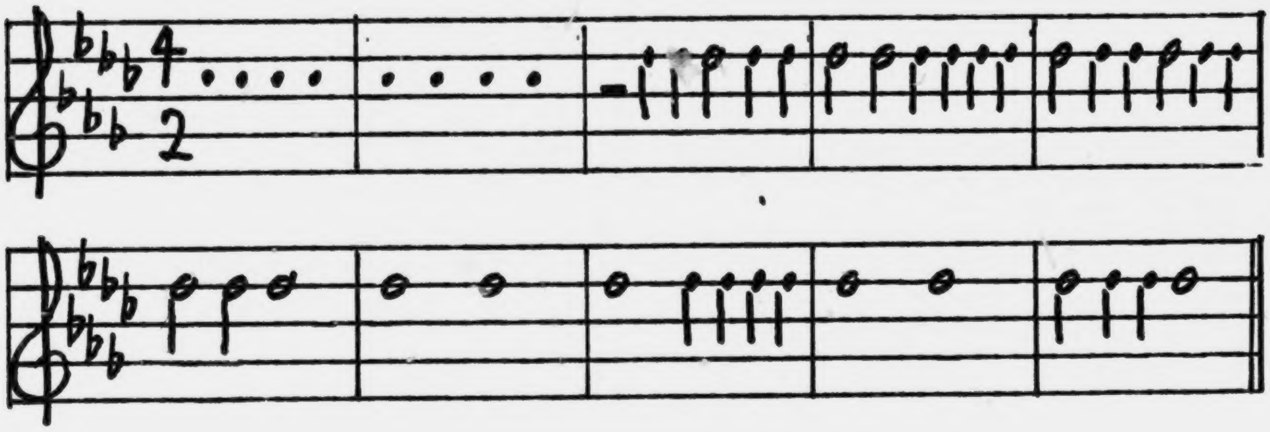




Item 226.

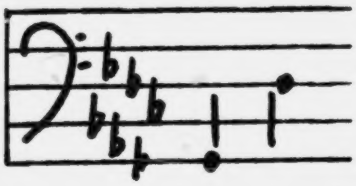
𝅗𝅥 - 84 Play D-flat

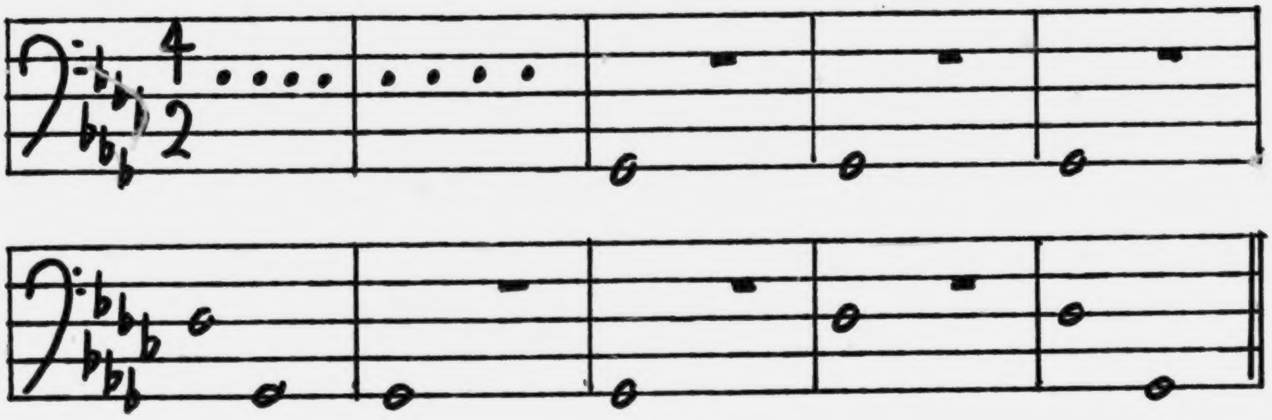




Item 227.

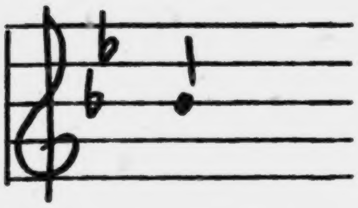
𝅗𝅥 - 84 Play G-flat and D-flat

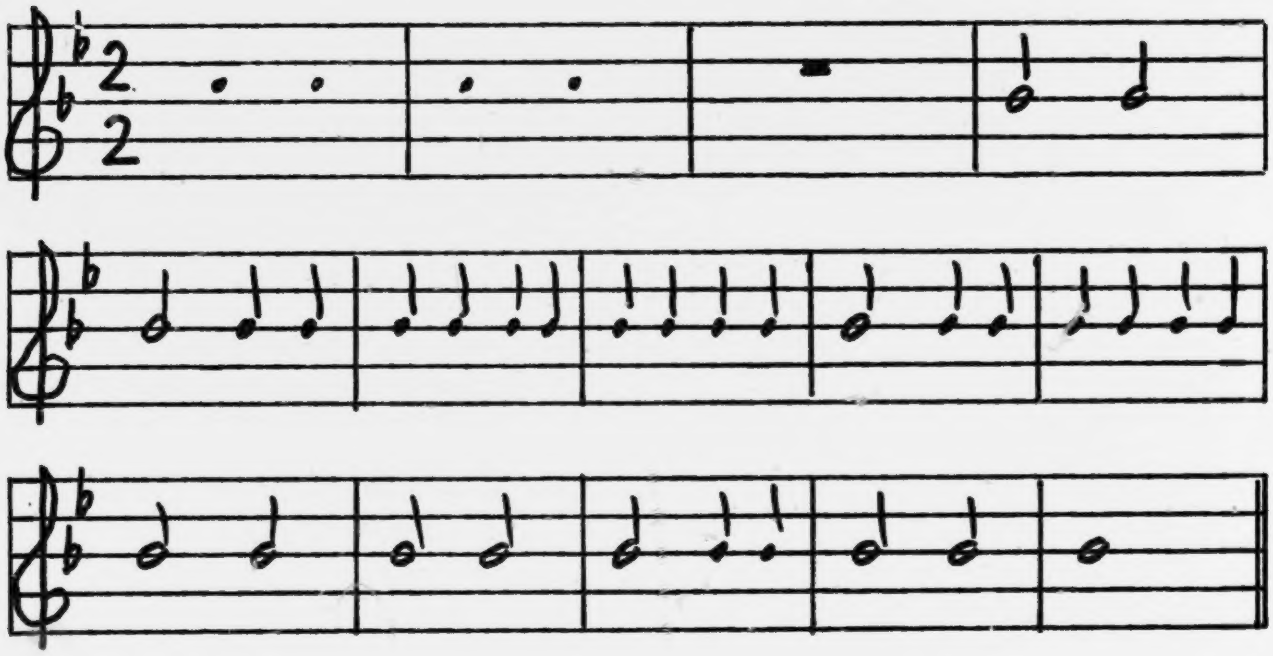




Item 228.

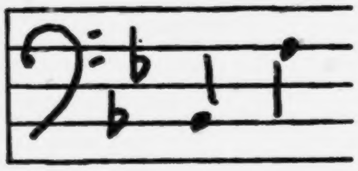
𝅗𝅥 - 88 Play B-flat

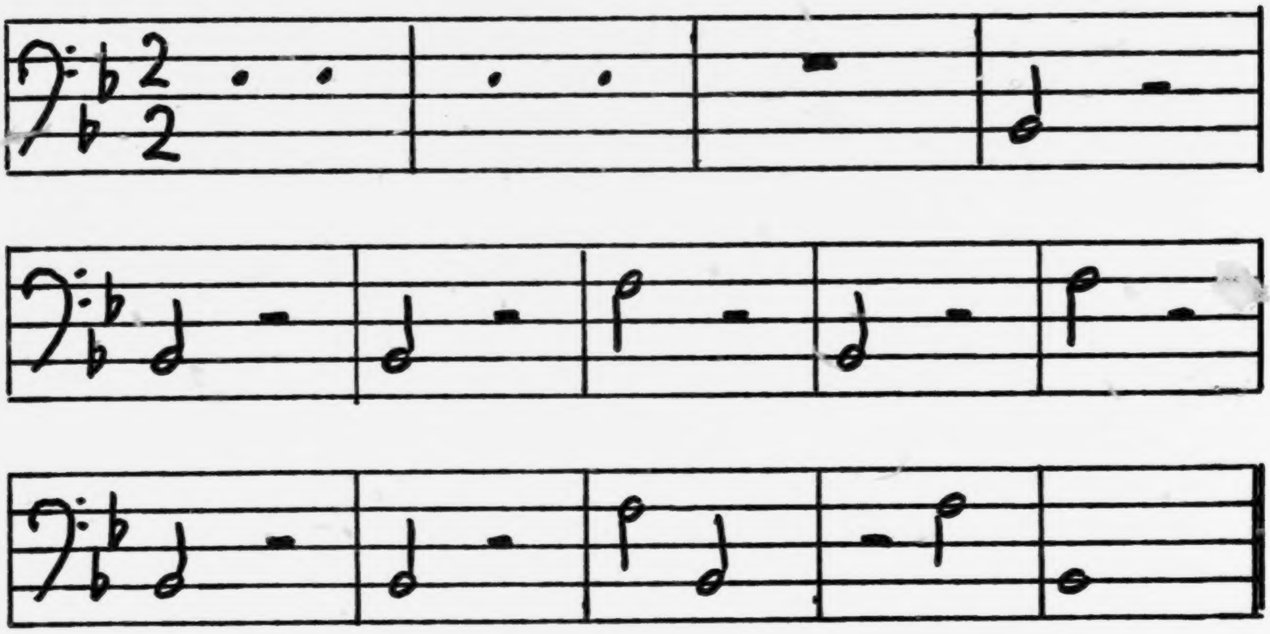




Item 229.

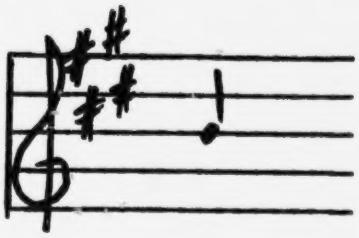
𝅗𝅥 - 88 Play B-flat and F

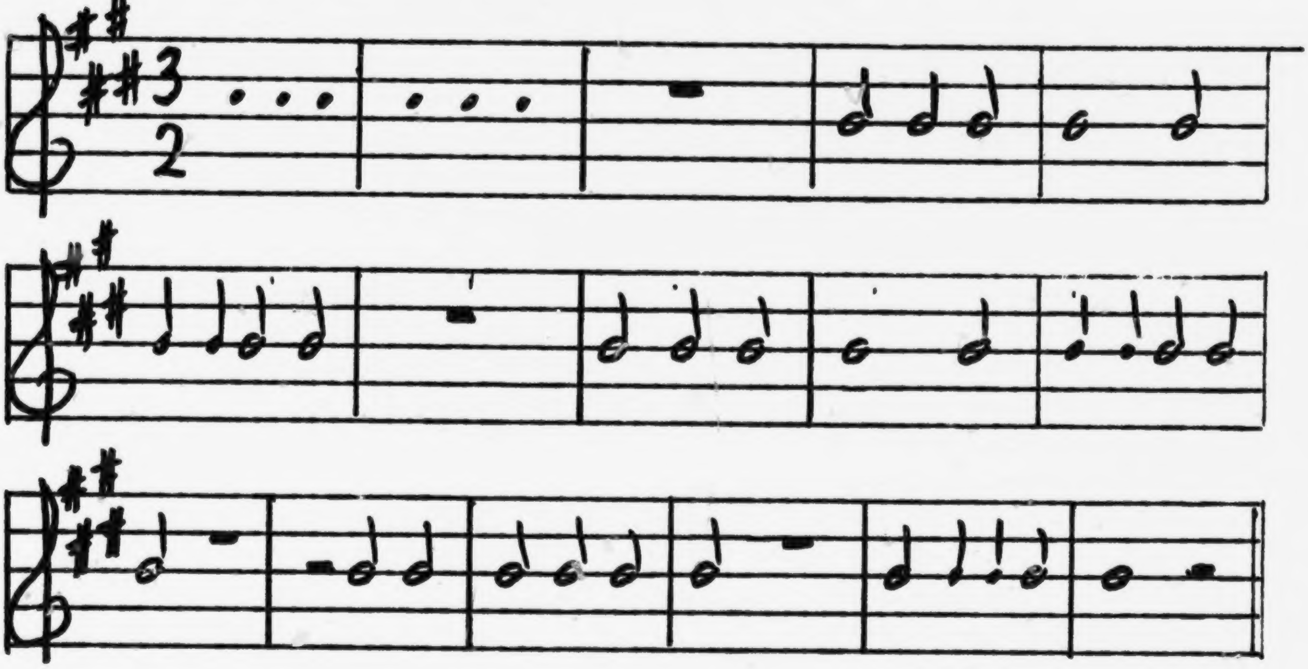




Item 230.

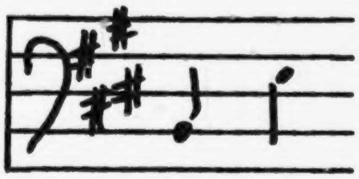
𝅗𝅥 - 88 Play B

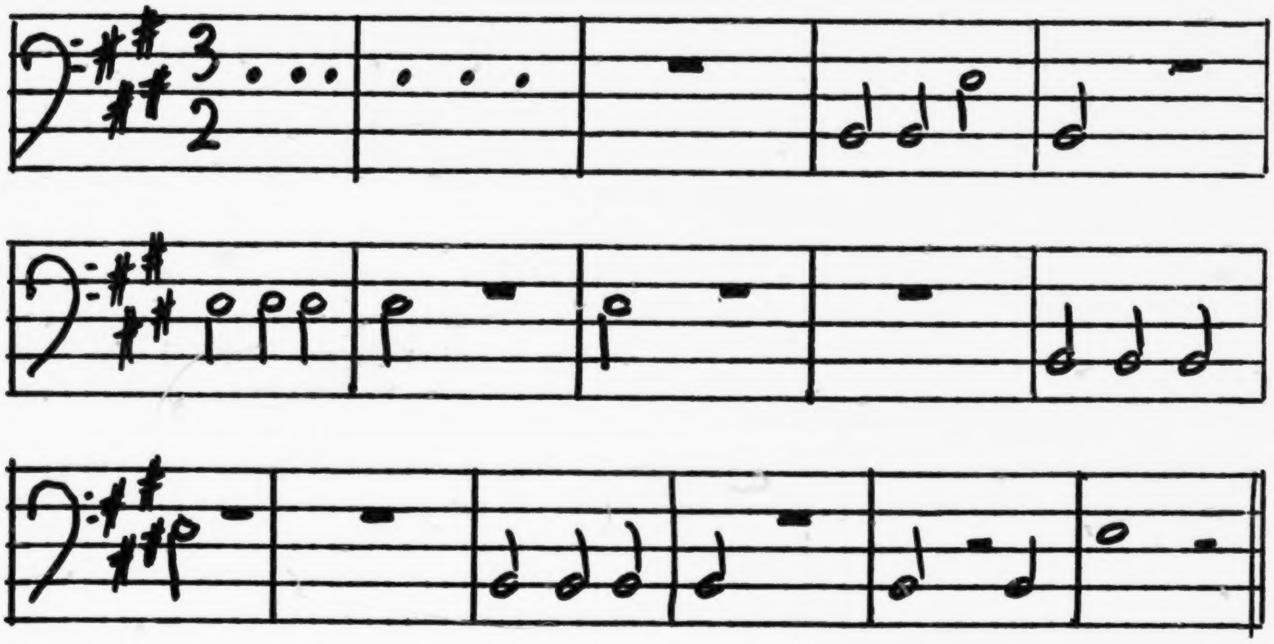




Item 231.

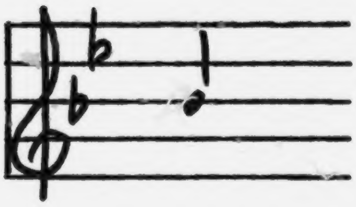
𝅗𝅥 - 88 Play B and E

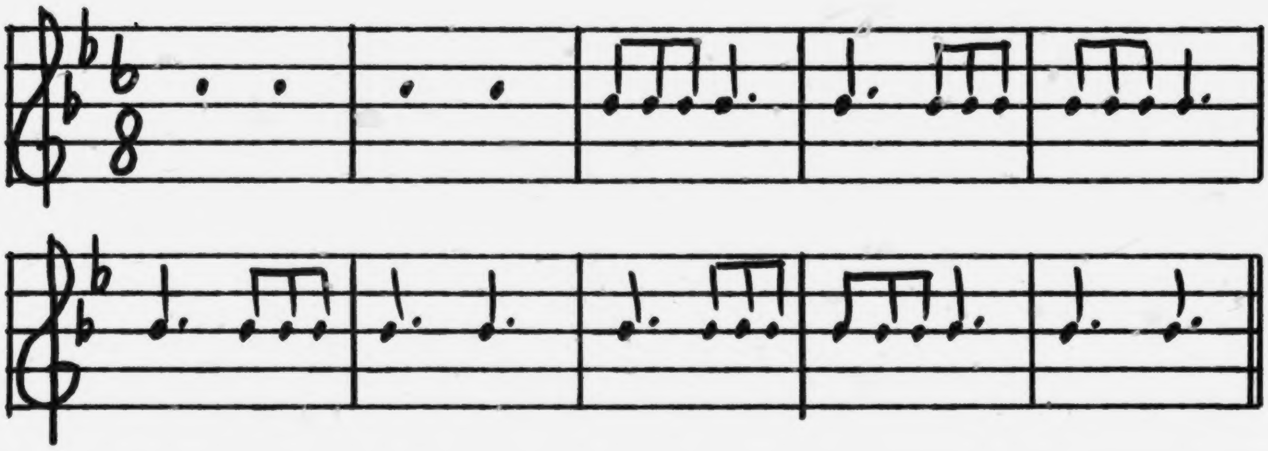




Item 232.

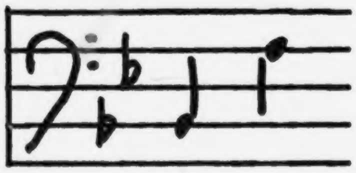
♩. - 76 Play B-flat

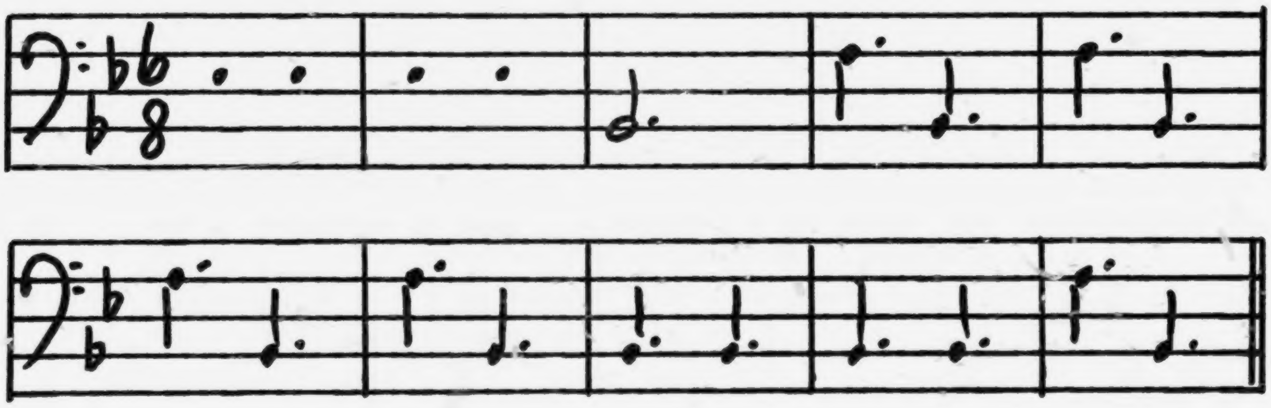




Item 233.

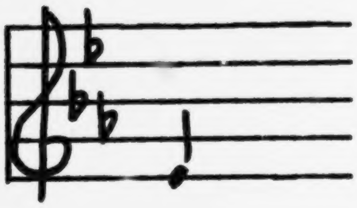
♩. - 76 Play B-flat and F

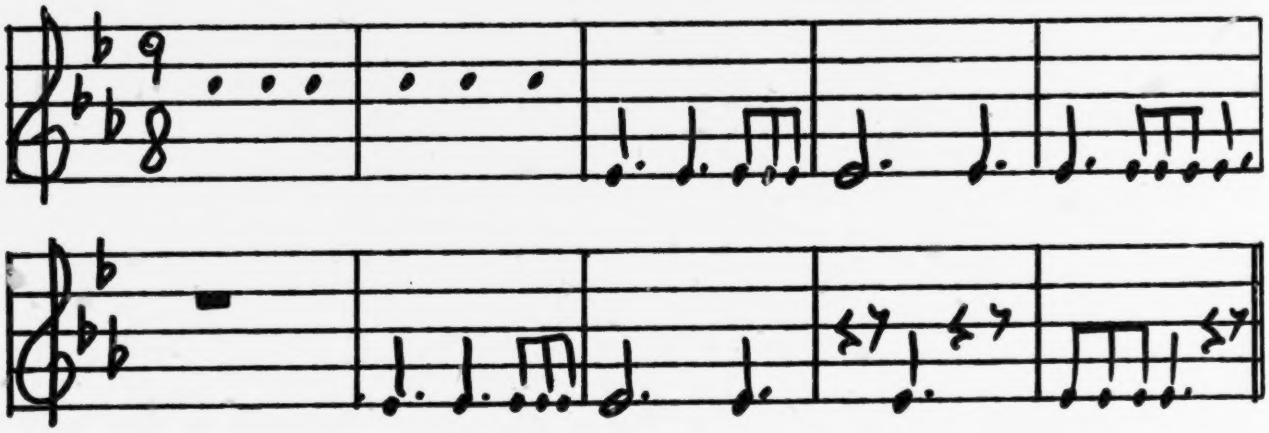




Item 234.

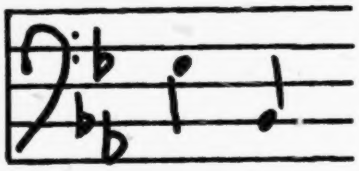
♩. - 76 Play E-flat

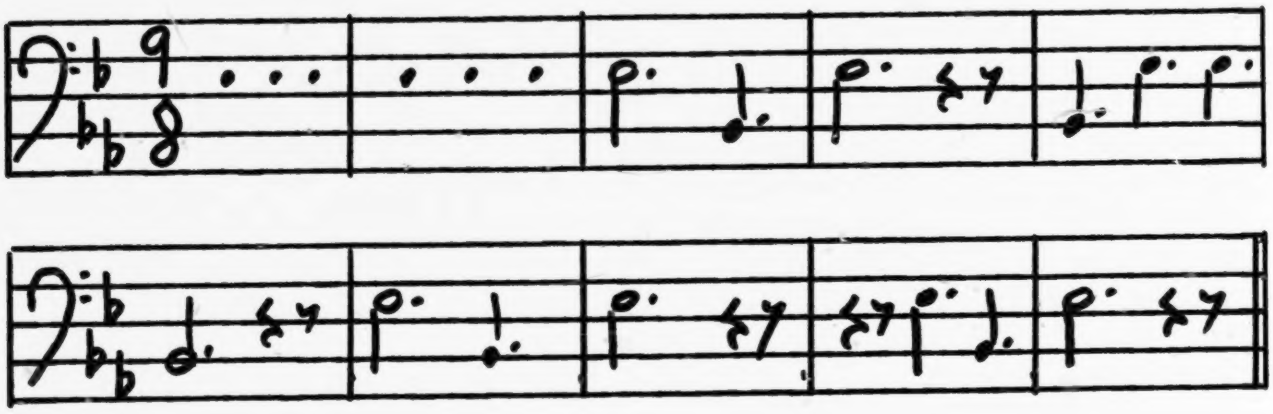




Item 235.

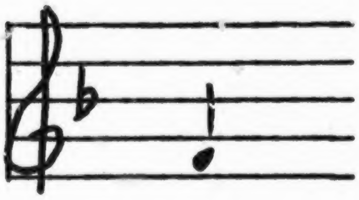
♩. - 76 Play E-flat and B-flat

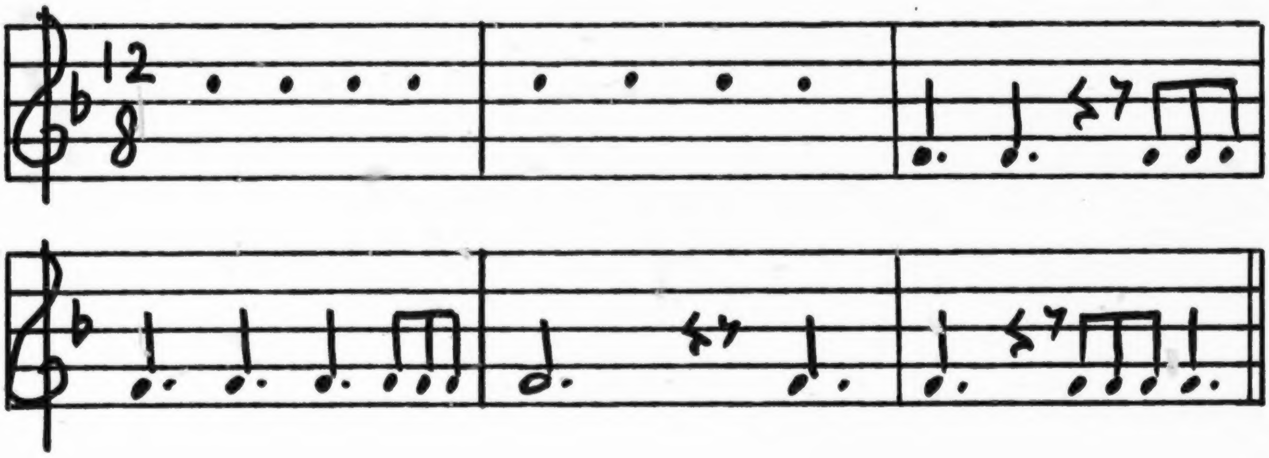




Item 236.

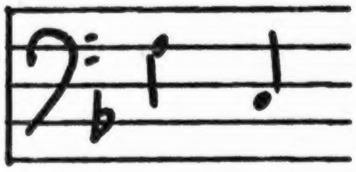
♩. - 72 Play F

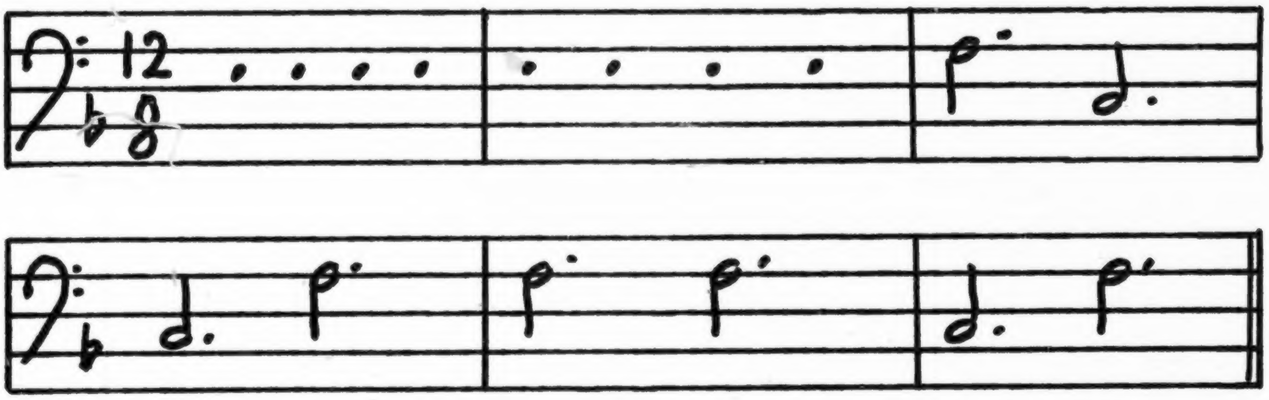




Item 237.

♩. - 72 Play F and C





END OF REVIEW

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APPENDIX A

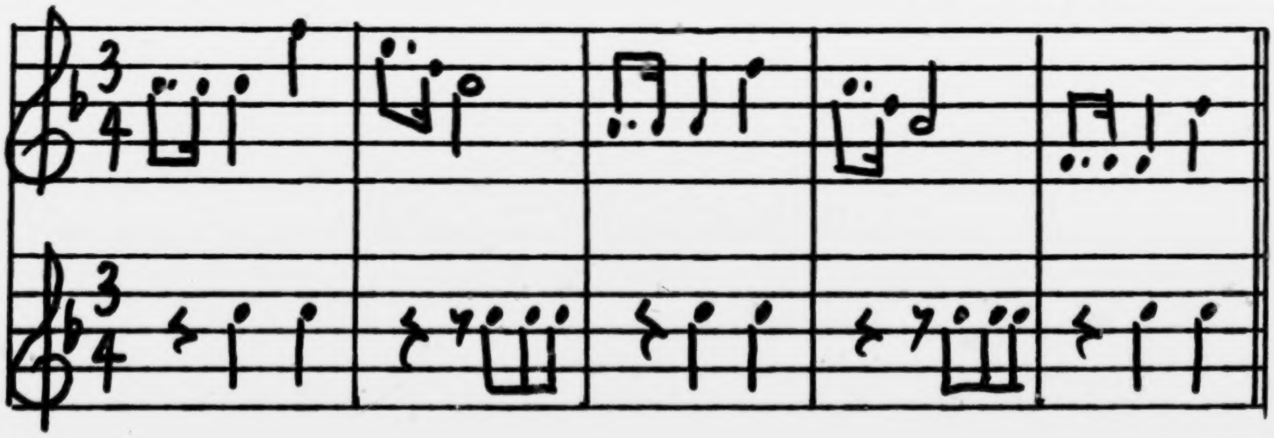
Examples of Background Music

In these examples the background appears in the upper line, and the rhythms of the training item in the lower line.

Example 1. (Item 154)

While the student plays equal divisions of the beat, the background contains unequal divisions which later appear as training elements. (Item 171)

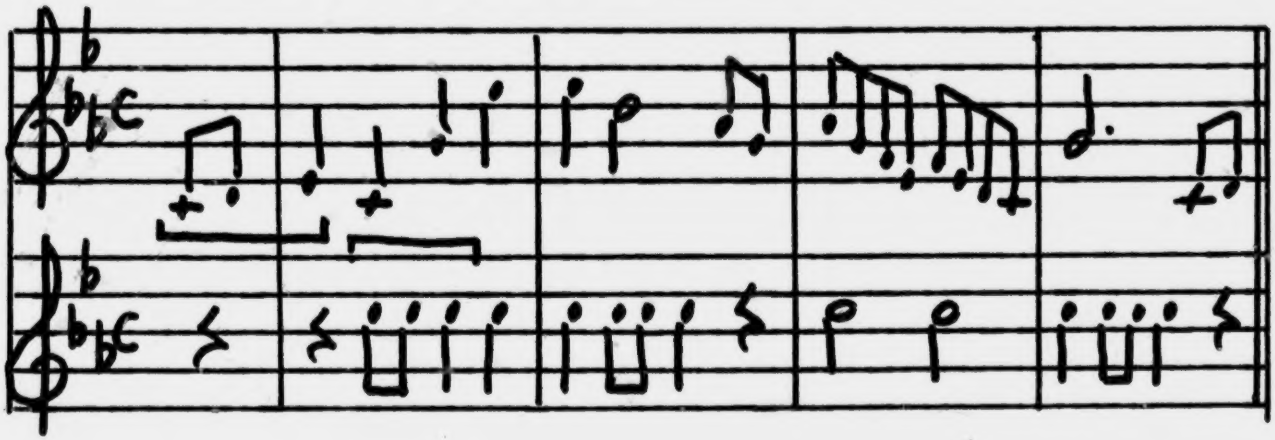
Chopin. Mazurka



Example 2. (Item 134)

Rhythm of background opening is imitated by training material but does not appear in both parts simultaneously.

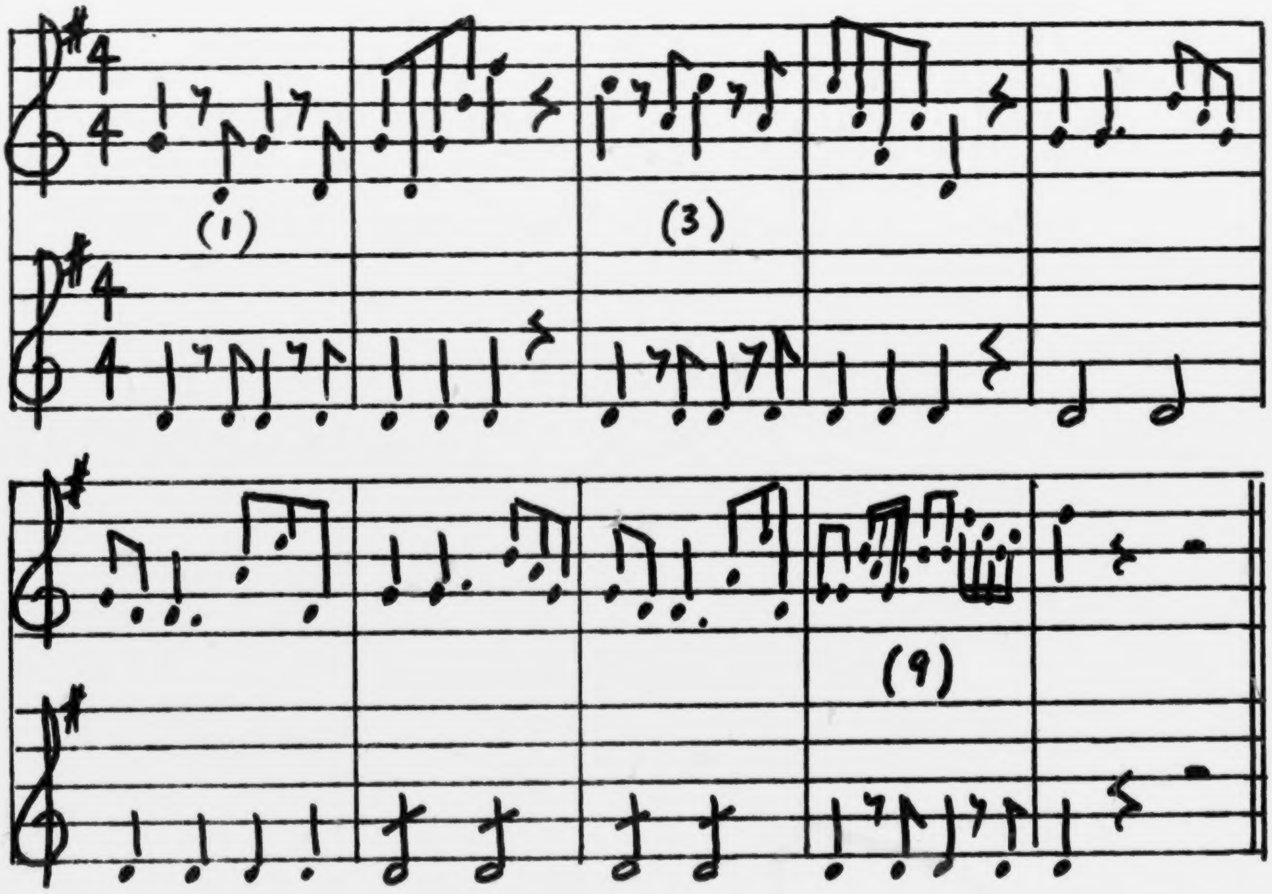
Handel



Example 3. (Item 151)

♩ 𝄾 ♪ appears simultaneously in measures one and three, and separately in measure nine.

Mozart



APPENDIX B

TRAINING SEQUENCE

I. Multiples of the Beat

		Items
1.	Introduction to taped information; voice and metronome ticks; symbols in manual for tempo, metronome sounds, and "arrow" to begin playing. Word "play" precedes arrow. Voice counting is written out. Student plays steady quarter notes in quarter beats.	1
2.	Melody in background. Student plays designated pitch, indicated by name ("C") and located by means of cardboard guide behind keyboard. Student plays indicated material in steady beats.	8
3.	Voice counting aloud is eliminated. Dots indicate introductory beats. Student begins to play at first quarter-note after the dots. Always two measures of introduction before playing begins.	10
4.	Eliminate arrow. Voice announces only the item number, pauses and repeats.	11
5.	Student taps once in each item. Beginning of background music indicated by an X.	14
6.	Metronome ticks only through the first beat of the third measure. Previously the metronome was heard throughout the item.	17
7.	Quarter-rests substituted for dots. Dots are retained for introductory two measures only.	19
8.	Background contains variety of rhythms.	23
9.	Whole-rest instead of four quarter-rests. More than one tap per item.	27
10.	Up-beat in background music.	32
11.	Half-note (4/4 and 2/4)	34
12.	Dotted half-note.	40
13.	Whole-note.	46

14.	Whole-rest.	50
15.	Half-rest.	51
16.	3/4 with rests.	53
17.	Review.	64
18.	Half-note beat in 2/2, 3/2, 4/2.	74
19.	Eighth-note beat in 2/8, 3/8.	82
20.	Eighth-rest in 2/8, 3/8, 4/8.	89
21.	Background melody begins after first student response.	93
22.	Dotted-quarter beat in 6/8, 9/8, 12/8.	95
23.	Review of Items 1 - 106. Notes now appear on the staff.	107

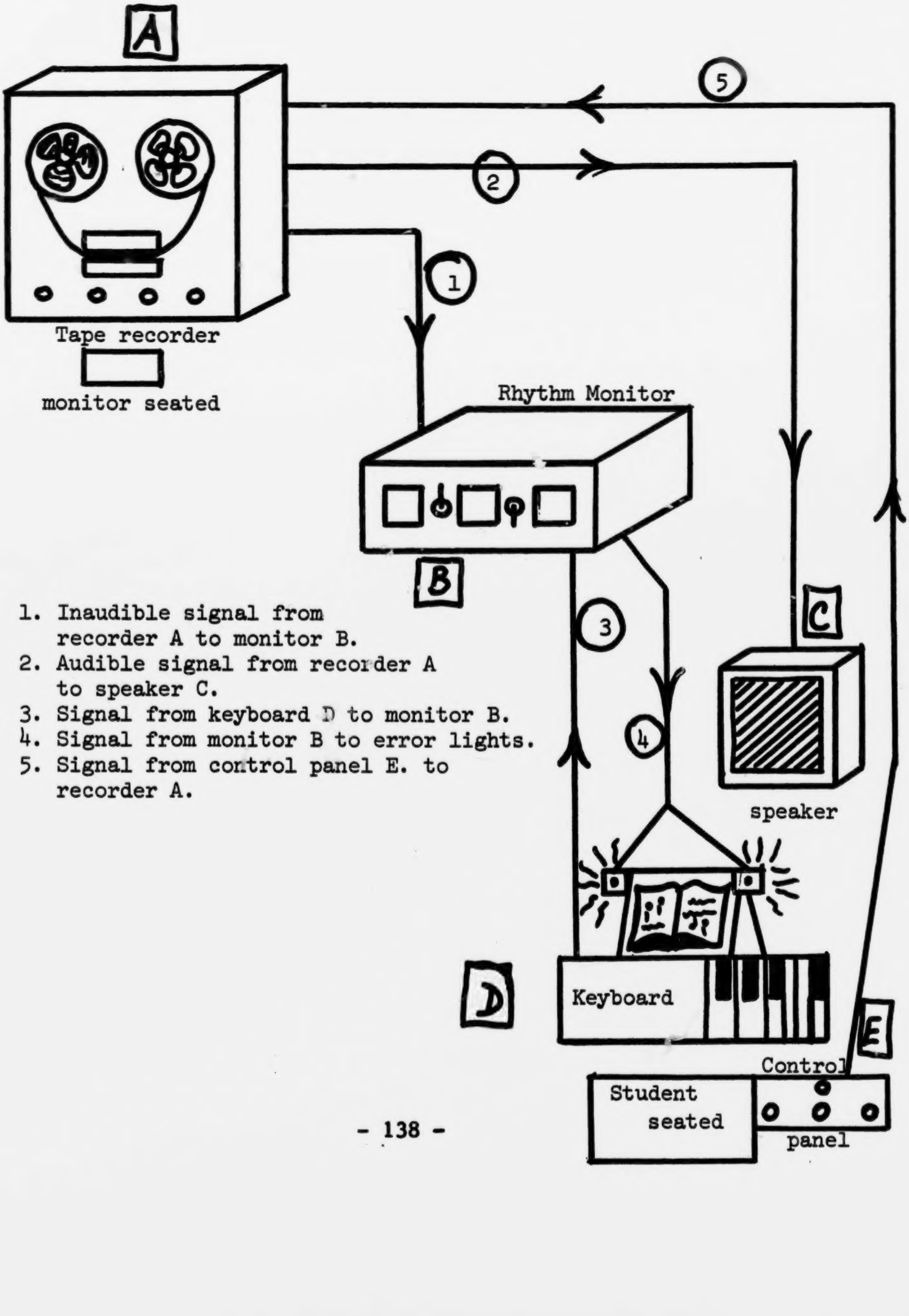
II. Equal Divisions of the Beat

24.	Introduction. 10 Examples.	
25.	Eighth-notes in quarter-beats.	132
26.	Dotted quarter-notes in 2/4, 3/4, 4/4.	141
27.	Eighth-note and eighth-rest in 2/4, 3/4, 4/4.	149
28.	Sixteenth-notes in eighth-beats.	161
29.	Dotted-eighth and sixteenths in eighth-beats.	171
30.	Quarter-notes in half-beats.	177
31.	Dotted-half and quarter in half-beats.	186
32.	Three eights in dotted-quarter beats.	192
33.	Review introducing Harmonic Movement. Paired Items. Students play two pitches. These are the roots of chords implied by the background melody.	200

APPENDIX C

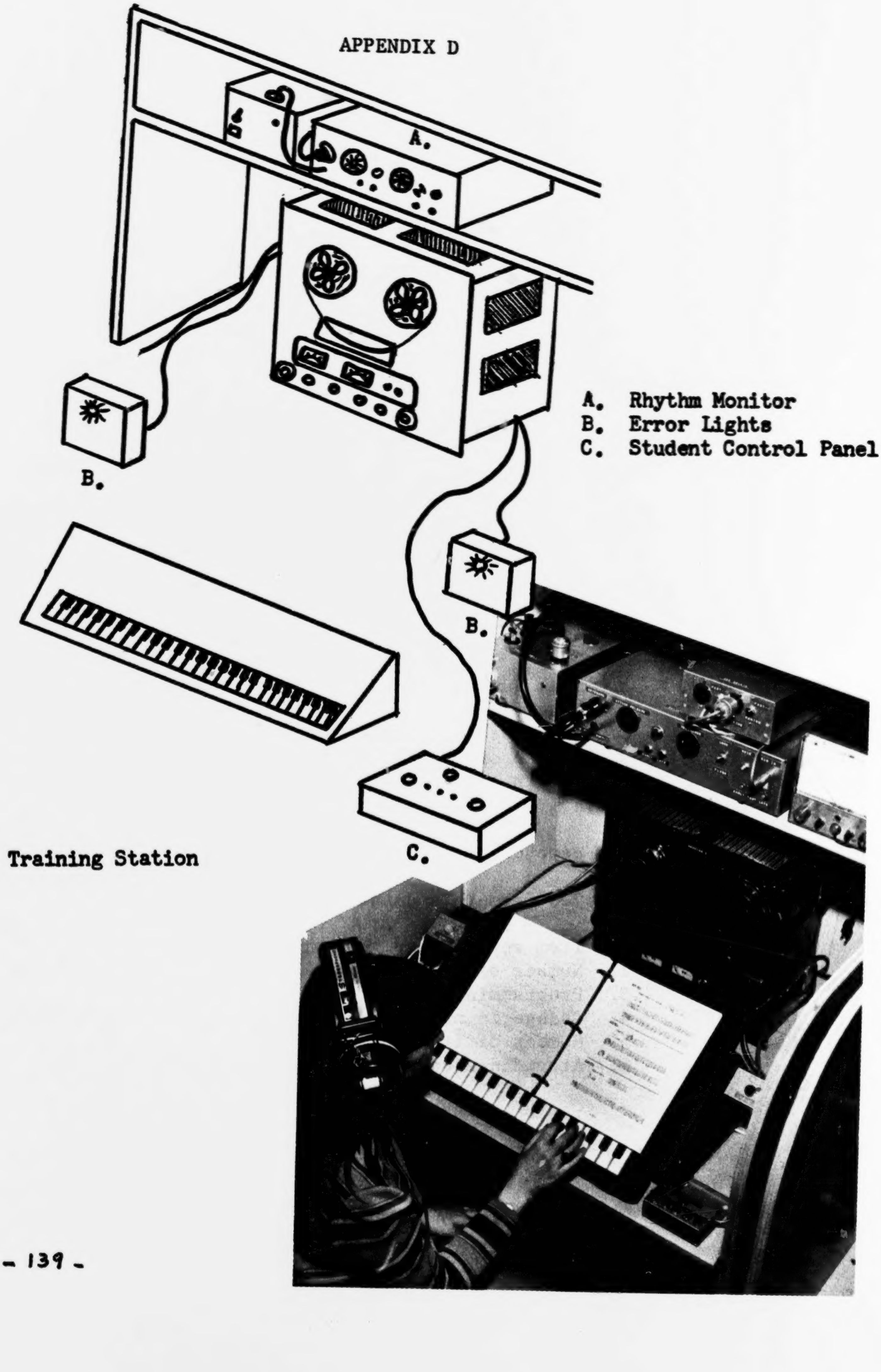
SCHEMATIC

RHYTHM TRAINING STATION


A
5
2
1
Tape recorder
monitor seated
Rhythm Monitor
B
3
C
4
speaker
D
Keyboard
E
Control
Student seated
panel

1. Inaudible signal from recorder A to monitor B.
2. Audible signal from recorder A to speaker C.
3. Signal from keyboard D to monitor B.
4. Signal from monitor B to error lights.
5. Signal from control panel E. to recorder A.

APPENDIX D



A. Rhythm Monitor
B. Error Lights
C. Student Control Panel

The Training Station

APPENDIX E

Data Sheet

A. 41	B. 9/14/68
C. 3	
D.	E.
F.	G.
H.	I.

A. Item Number
B. Date
C. Tolerance dial setting
D. Number of errors in first part
E. Number of errors in second part
F,G,H,I. Number of errors if item is repeated

Each data sheet page contains 72 of the above reduced in size.

Information derived from this data:

1. Item repeated or not repeated
2. Number of errors
3. Programming and sequencing in degree of difficulty
4. Change in number of errors on repetitions
5. Number of items completed in a 50-minute session
6. Attendance record

APPENDIX F.

STUDENT REACTION QUESTIONAIRE

Response

			Number (Total - 21)
1.	If programmed material in rhythm were not used in this course:		
	a.	I would have learned less.	19
	b.	It would not have made a difference.	2
	c.	I would have learned more.	0
2.	If I had a preference:		
	a.	I would like to use more programmed material of this type.	18
	b.	I would prefer not to use programmed material of this type.	1
	c.	It would not matter to me what materials were used.	2
3.	Check appropriate items (as many as you wish):		
	a.	I resented machine training.	0
	b.	I enjoyed machine training.	21
	c.	The signal lights upset me throughout the entire program.	3
	d.	The signal lights upset me at first, but I got used to them.	14
	e.	The signal lights never bothered me.	4
	f.	The signal lights helped me to know my mistakes.	21
	g.	The signal lights did not help me at all.	4
	h.	I tried to slow up if the early light lit, and speed up if the late light lit.	18
	i.	I felt rushed through the program.	0
	j.	I felt no pressure to hurry.	19
	k.	I liked the chance to repeat items if I wanted to.	21
	l.	The material was boring.	4
	m.	The background music was helpful.	18
	n.	I felt a part of the background music.	6
	o.	I was glad to reach the end of the program.	6
	p.	When I reached the end of the program, I wanted to continue.	12

APPENDIX G

TESTS

PRE-TEST

The pretest consisted of two parts. The first part contained units of two measures each, played on a single pitch, and repeated twice. Two measures of spoken counts preceding each unit defined the tempo. Units were derived from basic material common to both pretest and post-test.

BASIC MATERIAL

𝅝 in 4/2

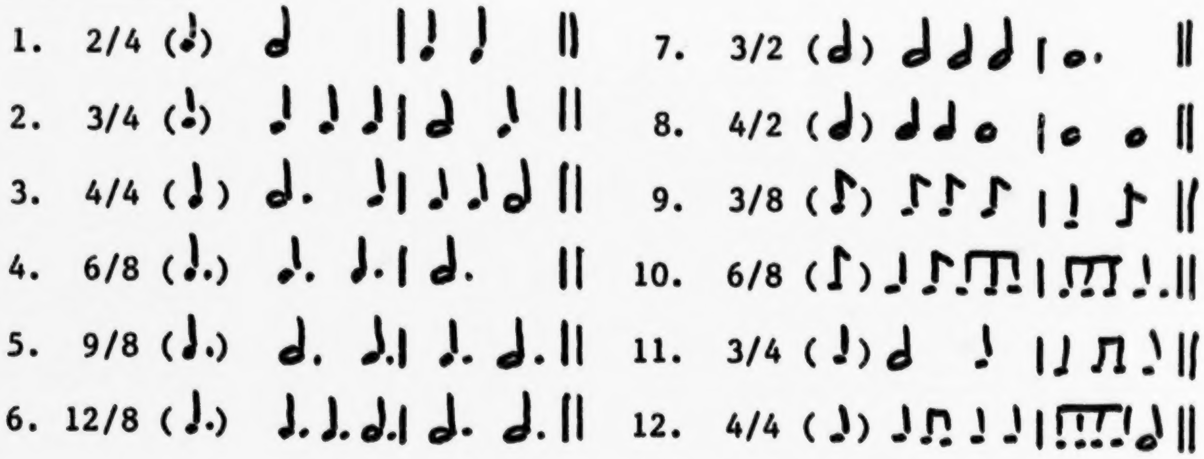
𝅗𝅥 in 2/4, 4/4, 3/2, 3/4

♩ in 2/4, 3/4, 4/4, 38, 6/8

♪ in 3/8, 6/8, 3/4, 4/4

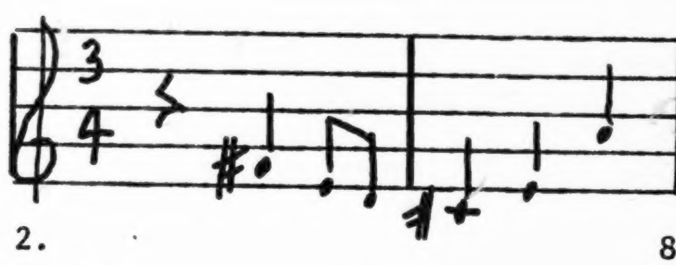
𝅗𝅥. in 4/4, 6/8, 9/8, 12/8

RHYTHMIC GROUPS


1. 2/4
2. 3/4
3. 4/4
4. 6/8
5. 9/8
6. 12/8
7. 3/2
8. 4/2
9. 3/8
10. 6/8
11. 3/4
12. 4/4

PRE-TEST. MELODIC GROUPS.

1.



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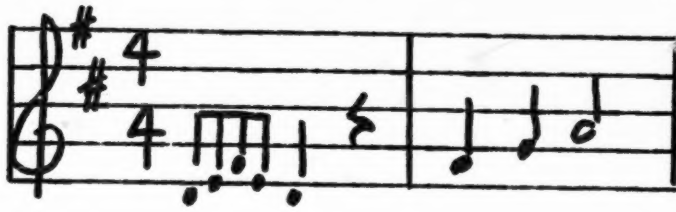

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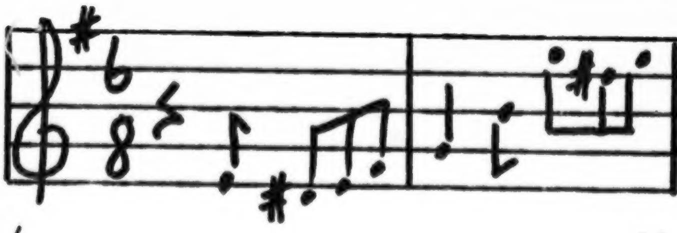

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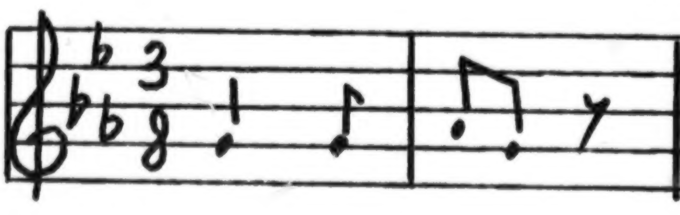

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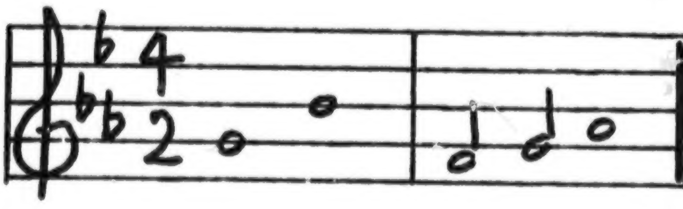

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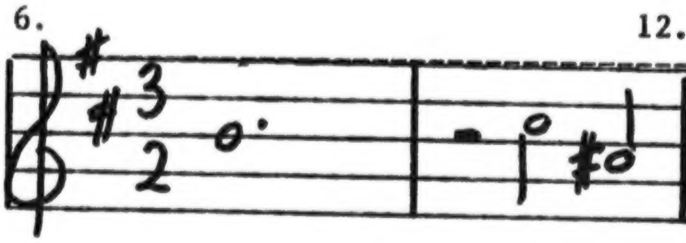

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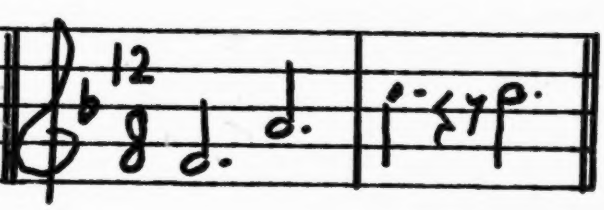

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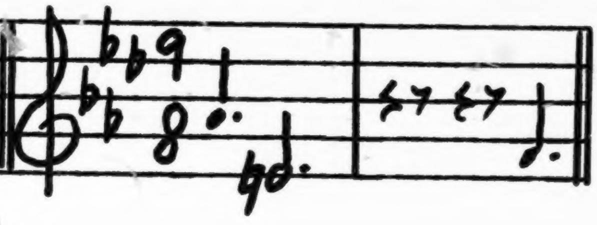

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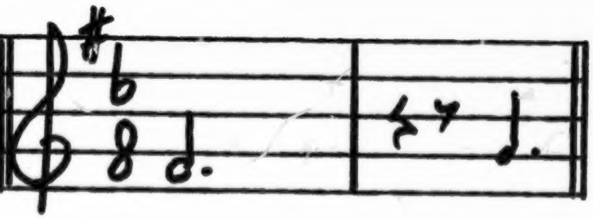

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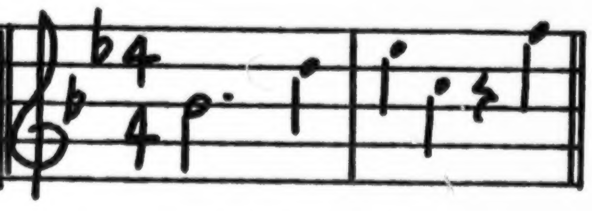

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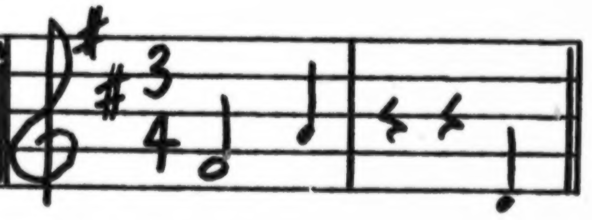

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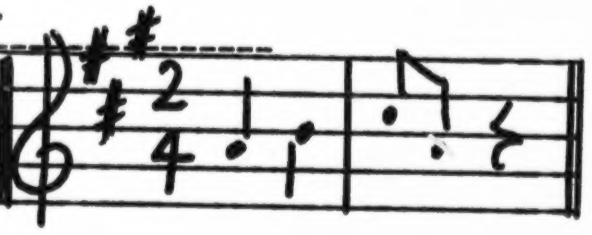
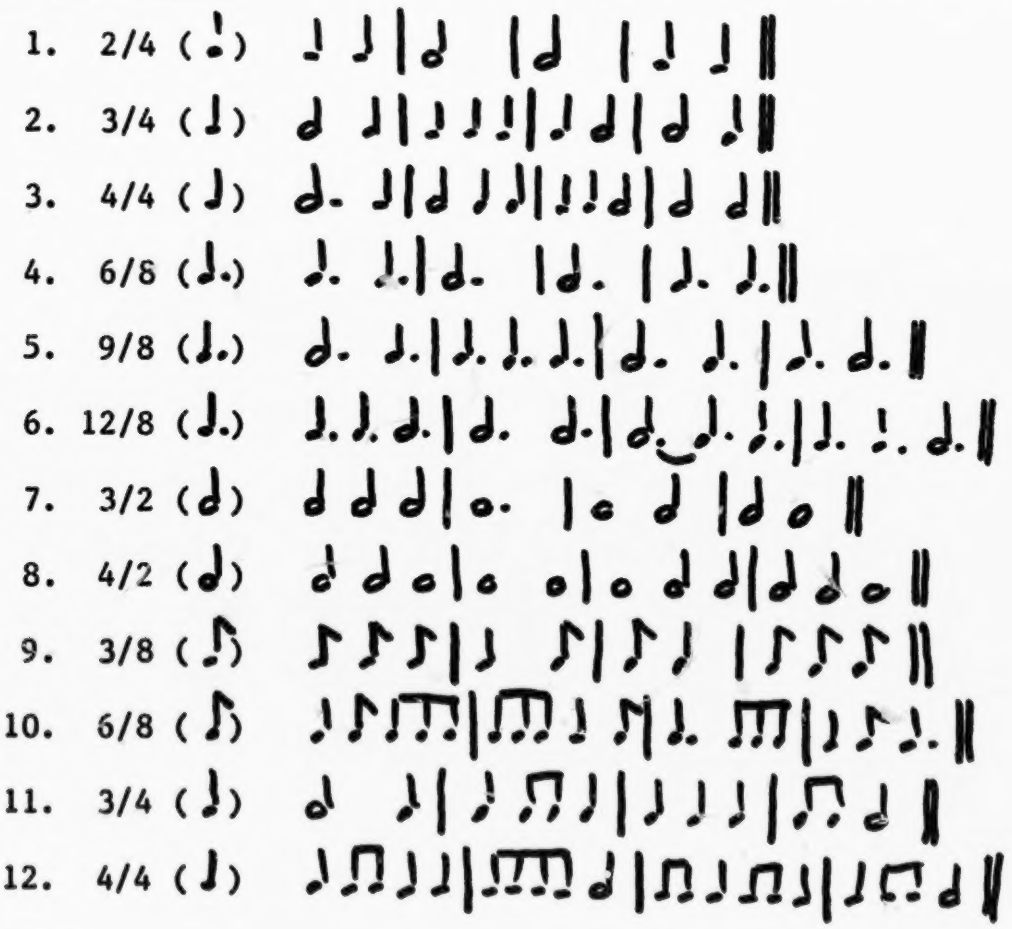


POST-TEST

The post-test also consisted of two parts. Basic material was similar to that in the pre-test, but each unit was four measures long, and was repeated only once.

RHYTHMIC GROUPS



SCORING

The scoring was based on a simple error count. Errors were tabulated on the following bases:

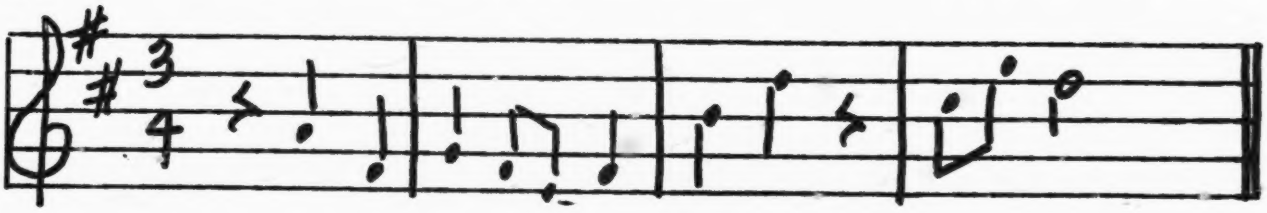
In comparing number of tones played with number of symbols written,

1. How many more written than dictated.
2. How many less written than dictated.
3. How many wrong symbols.
4. How many correct symbols in the wrong place in a measure.

Finally, the difference in raw error score between pre-test and post-test was noted.

POST-TEST. MELODIC GROUPS.

1.



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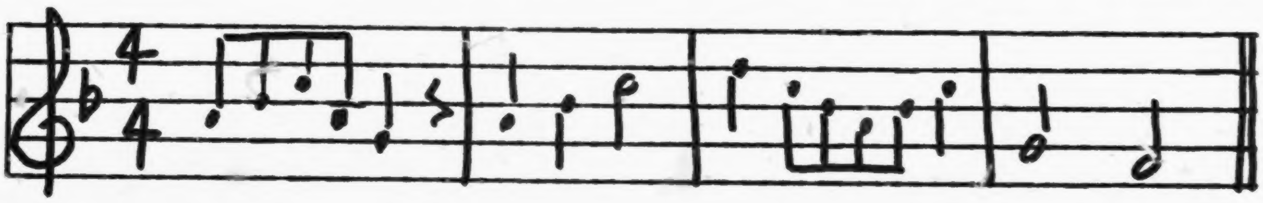

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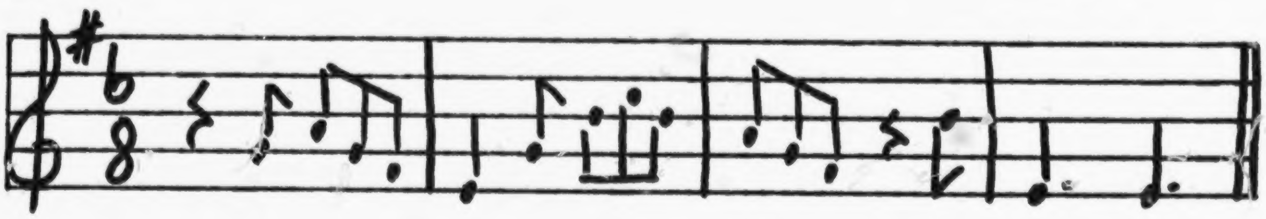

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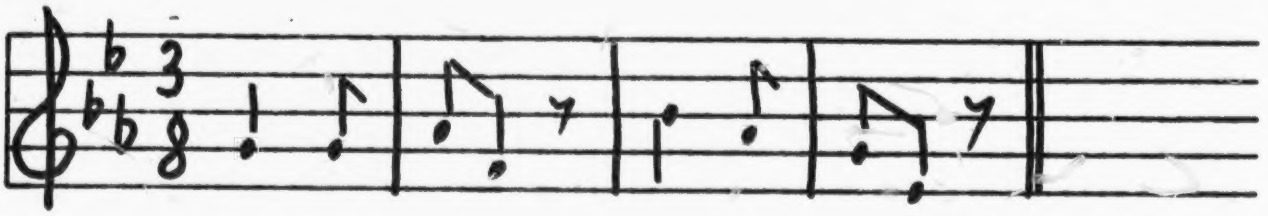

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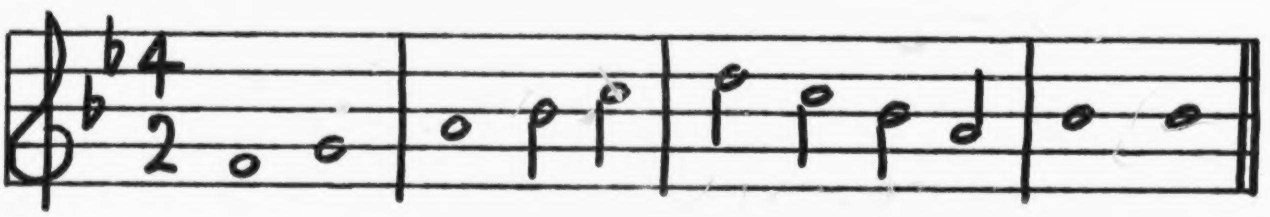

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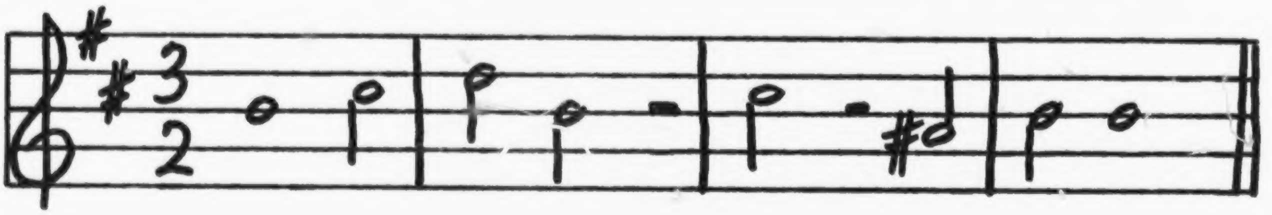
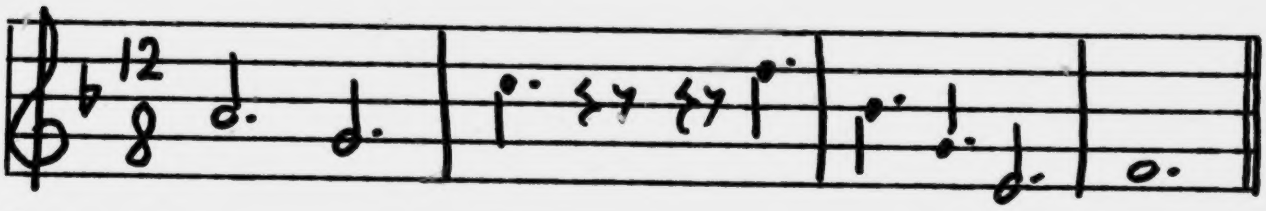


POST-TEST. MELODIC GROUPS. (continued)

7.



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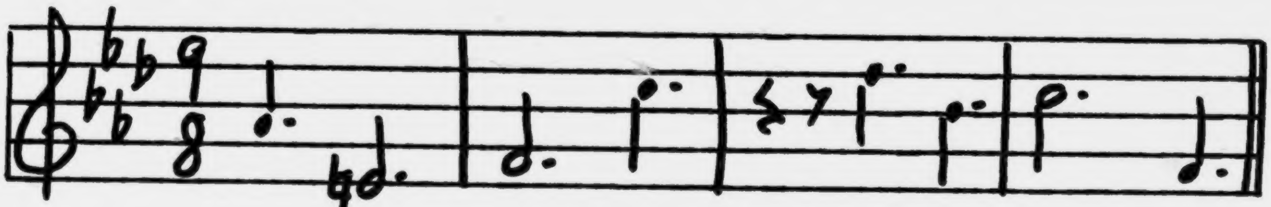

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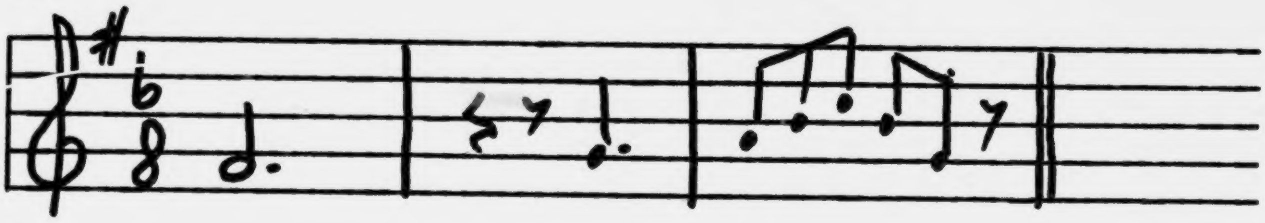

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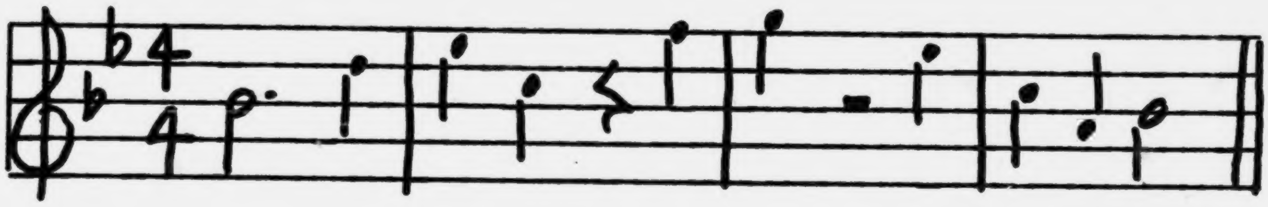

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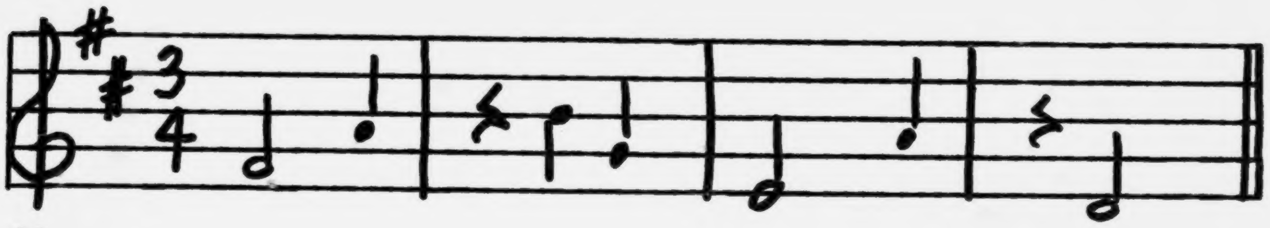

12.